KSA Tow Pilot Qualification

Sunflower Gliderport

Introduction

- This document provides the information and standardization of the requirements for a pilot to be considered a KSA qualified towpilot
- It is intended to be used with the KSA Towpilot Qualification Syllabus and Status Log

Requirements

1. Meet all FAA requirements for towing gliders as specified in 14 CFR Part 61.69.
   - The KSA tow pilot training syllabus in item 3 below will ensure this requirement is met.
2. Complete the SSF tow pilot training course, successfully pass the SSA Members final examination and present a copy of the certificate of completion
   - https://www.soaringsafety.org/learning/towpilot/towpilot.html
3. Complete the KSA tow pilot training syllabus. The combined syllabus and record of completion consist of ground training, glider flight training, and tow plane flight training

Regulations

14 CFR Part 61.69 – Glider and unpowered ultralight vehicle towing: Experience and training requirements

- (a) No person may act as pilot in command for towing a glider or unpowered ultralight vehicle unless that person—
  - (1) Holds a private, commercial or airline transport pilot certificate with a category rating for powered aircraft;
  - (2) Has logged at least 100 hours of pilot-in-command time in the aircraft category, class and type, if required, that the pilot is using to tow a glider or unpowered ultralight vehicle;
  - (3) Has a logbook endorsement from an authorized instructor who certifies that the person has received ground and flight training in gliders or unpowered ultralight vehicles and is proficient in—
    - (i) The techniques and procedures essential to the safe towing of gliders or unpowered ultralight vehicles, including airspeed limitations;
    - (ii) Emergency procedures;
    - (iii) Signals used; and
    - (iv) Maximum angles of bank.

Regulations

14 CFR Part 61.69

- (4) Except as provided in paragraph (b) of this section, has logged at least three flights as the sole manipulator of the controls of an aircraft while towing a glider or unpowered ultralight vehicle, or has simulated towing flight procedures in an aircraft while accompanied by a pilot who meets the requirements of paragraphs (c) and (d) of this section.
- (5) Except as provided in paragraph (b) of this section, has received a logbook endorsement from the pilot, described in paragraph (a)(4) of this section, certifying that the person has accomplished at least 3 flights in an aircraft while towing a glider or unpowered ultralight vehicle, or while simulating towing flight procedures; and
- (6) Within 24 calendar months before the flight has—
  - (i) Made at least three actual or simulated tows of a glider or unpowered ultralight vehicle while accompanied by a qualified pilot who meets the requirements of this section; or
  - (ii) Made at least three flights as pilot in command of a glider or unpowered ultralight vehicle towed by an aircraft.

Regulations

14 CFR Part 61.69

- (b) Any person who, before May 17, 1967, has made and logged 10 or more flights as pilot in command of an aircraft towing a glider or unpowered ultralight vehicle in accordance with a certificate of waiver need not comply with paragraphs (a)(4) and (a)(5) of this section.
- (c) The pilot, described in paragraph (a)(4) of this section, who endorses the logbook of a person seeking towing privileges must have—
  - (1) Met the requirements of this section prior to endorsing the logbook of the person seeking towing privileges; and
  - (2) Logged at least 10 flights as pilot in command of an aircraft while towing a glider or unpowered ultralight vehicle.

Regulations

14 CFR Part 61.69

- (d) If the pilot described in paragraph (a)(4) of this section holds only a private pilot certificate, then that pilot must have—
  - (1) Logged at least 100 hours of pilot-in-command time in airplanes, or 200 hours of pilot-in-command time in a combination of powered and other-than-powered aircraft; and
  - (2) Performed and logged at least three flights within the 12 calendar months preceding the month that pilot accompanies or endorses the logbook of a person seeking towing privileges—
    - (i) In an aircraft while towing a glider or unpowered ultralight vehicle accompanied by another pilot who meets the requirements of this section; or
    - (ii) As pilot in command of a glider or unpowered ultralight vehicle being towed by another aircraft.

Regulations

14 CFR Part 91.309 – Towing: Gliders and unpowered ultralight vehicles

- (a) No person may operate a civil aircraft towing a glider or unpowered ultralight vehicle unless—
  - (1) The pilot in command of the towing aircraft is qualified under §61.69 of this chapter;
  - (2) The towing aircraft is equipped with a tow-hitch of a kind, and installed in a manner, that is approved by the Administrator;

Regulations

14 CFR Part 91.309

- (3) The towline used has breaking strength not less than 80 percent of the maximum certificated operating weight of the glider or unpowered ultralight vehicle 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 or unpowered ultralight vehicle if—
  - (i) A safety link is installed at the point of attachment of the towline to the glider or unpowered ultralight vehicle with a breaking strength not less than 80 percent of the maximum certificated operating weight of the glider or unpowered ultralight vehicle 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 or unpowered ultralight vehicle end of the towline and not greater than twice the maximum certificated operating weight of the glider or unpowered ultralight vehicle;

Regulations

14 CFR Part 91.309

- (4) Before conducting any towing operation within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport, or before making each towing flight within such controlled airspace if required by ATC, the pilot in command notifies the control tower. If a control tower does not exist or is not in operation, the pilot in command must notify the FAA flight service station serving that controlled airspace before conducting any towing operations in that airspace; and
- (5) The pilots of the towing aircraft and the glider or unpowered ultralight vehicle have agreed upon a general course of action, including takeoff and release signals, airspeeds, and emergency procedures for each pilot.

- (b) No pilot of a civil aircraft may intentionally release a towline, after release of a glider or unpowered ultralight vehicle, in a manner that endangers the life or property of another.

Regulations

14 CFR Part 61.31(f) Additional training required for operating high-performance airplanes

- (1) Except as provided in paragraph (f)(2) of this section, no person may act as pilot in command of a high-performance airplane (an airplane with an engine of more than 200 horsepower), unless the person has—
  - (i) Received and logged ground and flight training from an authorized instructor in a high-performance airplane, or in a full flight simulator or flight training device that is representative of a high-performance airplane, and has been found proficient in the operation and systems of the airplane; and
  - (ii) Received a one-time endorsement in the pilot's logbook from an authorized instructor who certifies the person is proficient to operate a high-performance airplane.

Regulations

14 CFR Part 61.31(f)

- (2) The training and endorsement required by paragraph (f)(1) of this section is not required if—
  - (i) The person has logged flight time as pilot in command of a high-performance airplane, or in a full flight simulator or flight training device that is representative of a high-performance airplane prior to August 4, 1997; or
  - (ii) The person has received ground and flight training under an approved training program and has satisfactorily completed a competency check under §135.293 of this chapter in a high performance airplane, or in a full flight simulator or flight training device that is representative of a high performance airplane which must be documented in the pilot's logbook or training record.

Tow Plane Operations

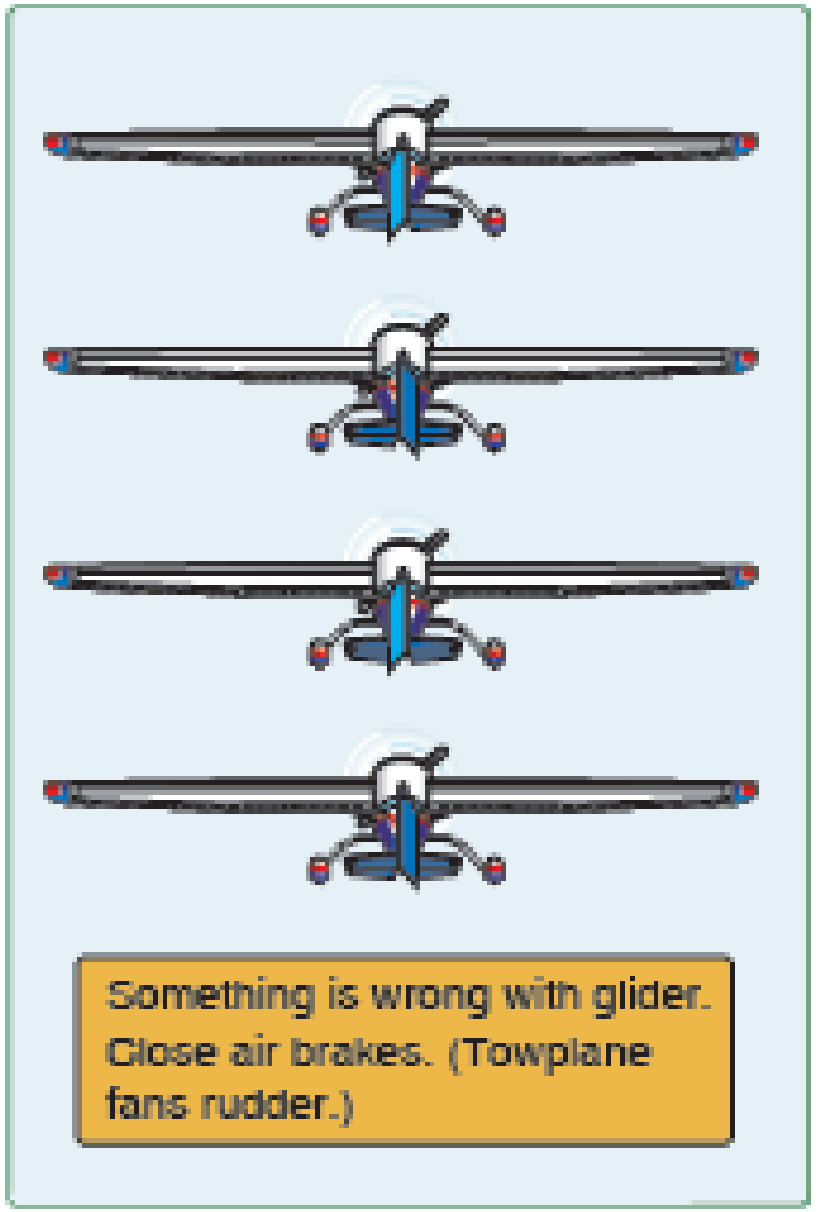
- The instructor should lead the candidate through an aircraft familiarization session for each aircraft, as applicable (C-175, C-182), to include:
  - Cockpit brief
    - location of all controls and instruments
    - Tow rope release
    - Checklist usage and familiarization
    - Fuel quantities and number of tows between fill-up
    - Tow tickets
  - Walkaround
    - Inspection of tow hook
    - Rear view mirror adjustment and positioning
  - Unique characteristics
    - C-175 nose heaviness requires Flap 2 landings only
  - Fuel & Oil procedures
  - Windshield cleaning
  - Positioning in hangar
  - Maintenance & Issues – call maintenance officer – Steve Leonard

Tow Plane Operations

- All normal flight operations should be smooth and deliberate
  - Consider that there is another pilot that is flying in formation behind you
  - Airspeed control should be precise and at the requested tow speed
  - Gliders have maximum tow speed limits and high performance gliders may not maneuver as well at speeds that are too slow
  - Bank angle in turns should ideally be approximately 20 degrees and definitely no greater than 30 degrees
  - When glider releases, tow plan conducts left turn for separation

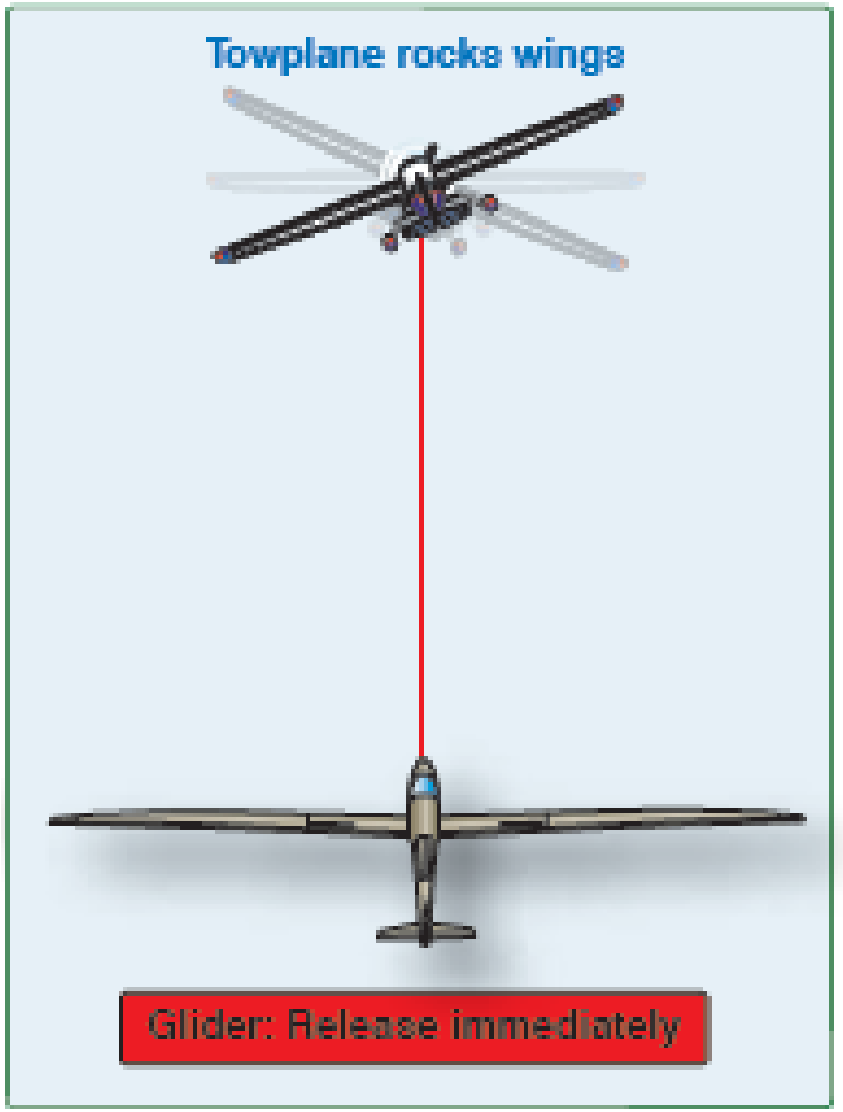
Tow Plane Operations

- Signals
  - Tow plane rapid rudder waggle - Something is wrong with glider (usually spoilers extended)



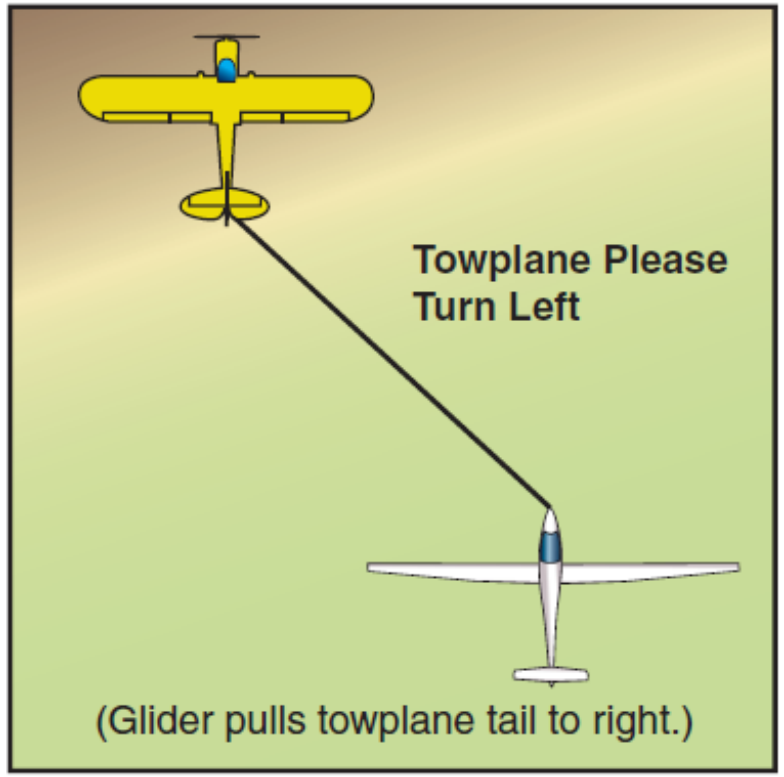
Tow Plane Operations

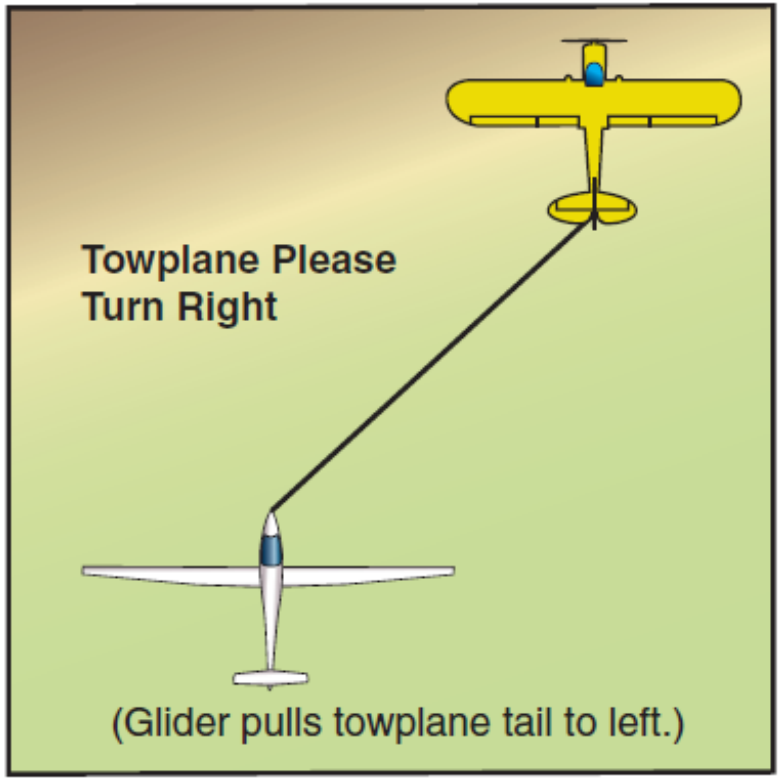
- Signals
  - Tow plane rocks wings – Glider should release immediately



Tow Plane Operations

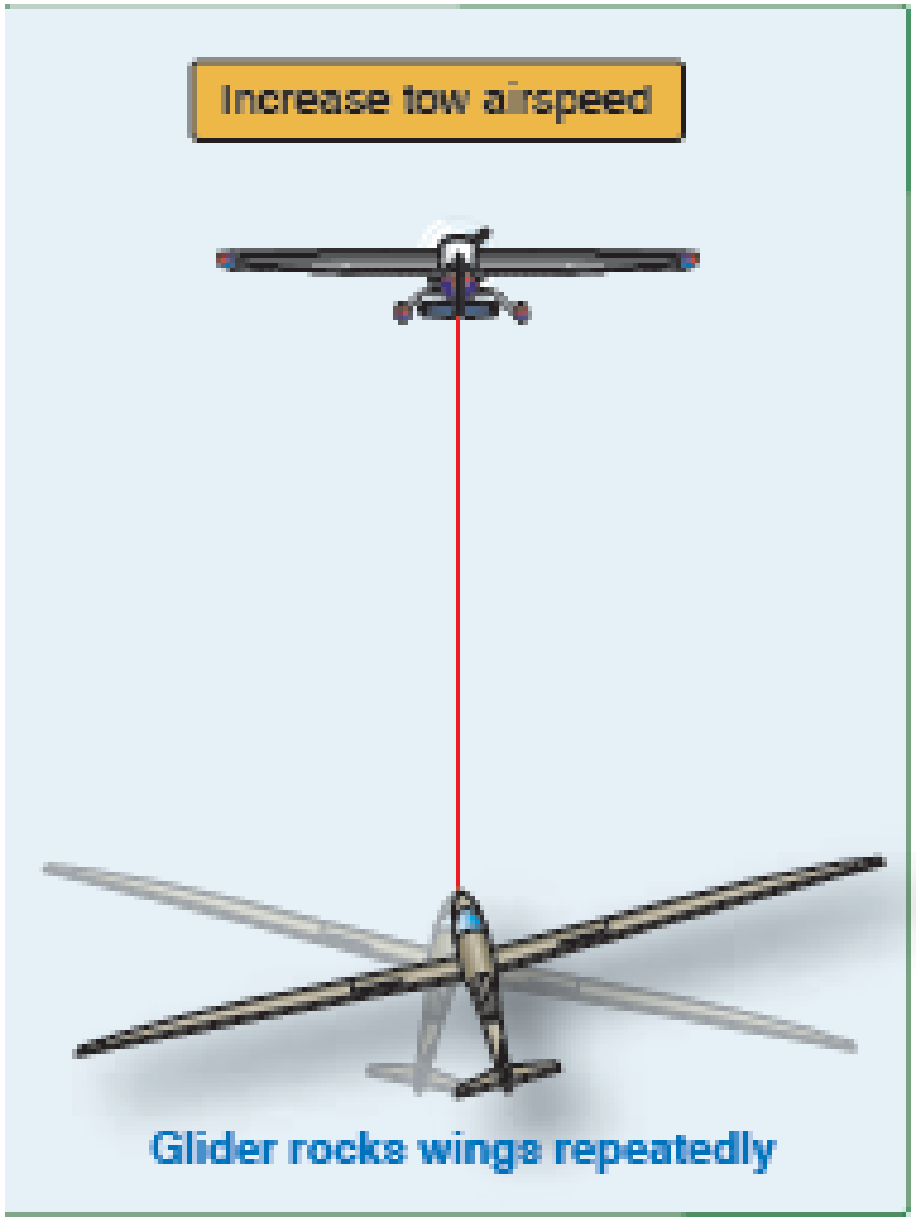
- Signals
  - Glider pulls tow plane tail left or right – Towplane please turn in direction your nose is being pulled (glider out left, turn right; glider out right, turn left)





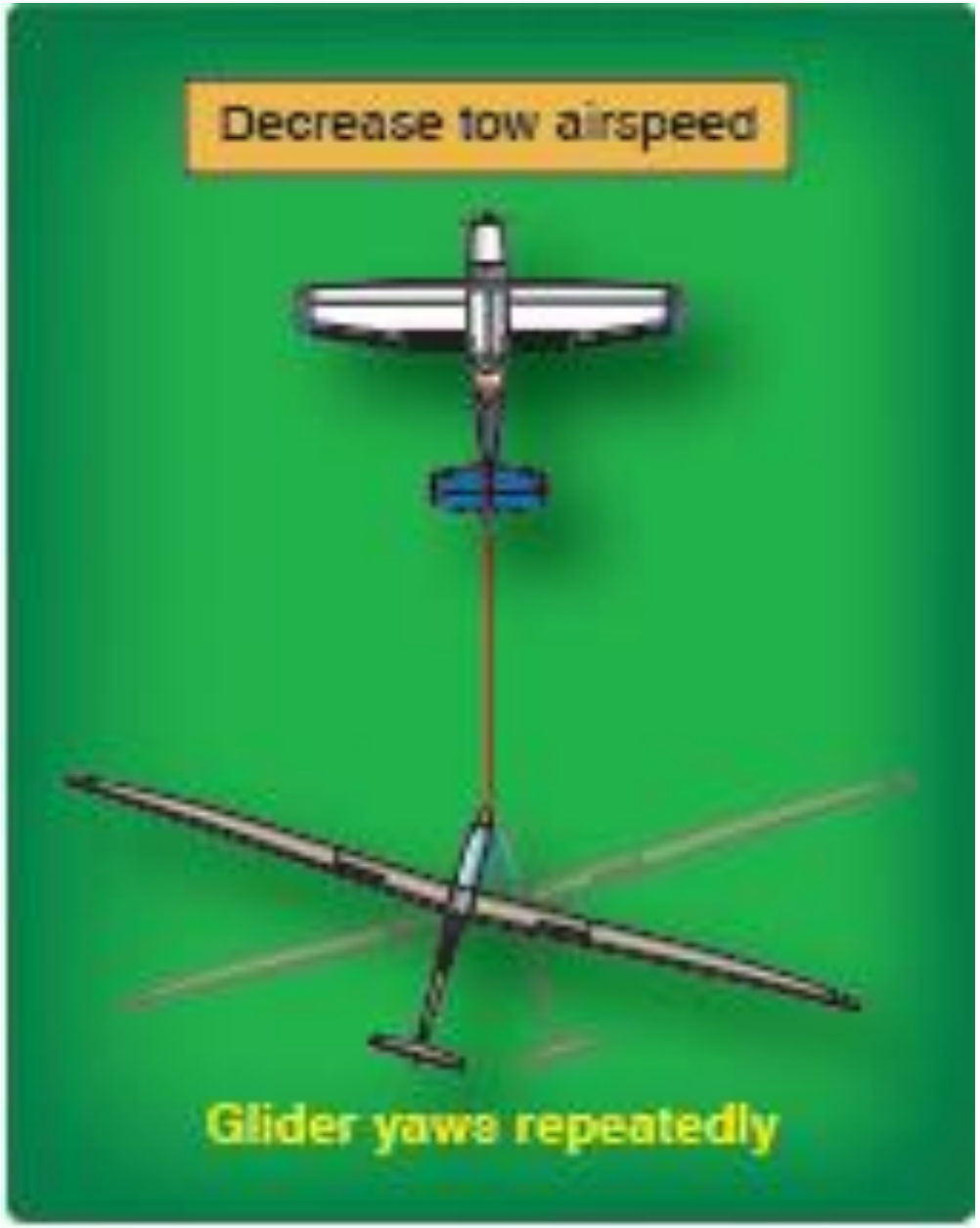
Tow Plane Operations

- Signals
  - Glider rocks wings repeatedly – Increase tow airspeed



Tow Plane Operations

- Signals
  - Glider yaws repeatedly – Decrease tow airspeed



Tow Plane Operations

- Risk Management
  - Towing operations are inherently higher risk than single aircraft operations
  - The tow pilot should prepare accordingly and identify hazards and mitigate risks. A good resource (not specific to towing) is the FAA Risk Management Handbook
  - There are numerous checklists such as PAVE, or others
    - **P**ilot-in-command
    - **A**ircraft
    - En**V**ironment
    - **E**xternal pressures
  - Be prepared to discuss operations with glider pilots, line crew, or KSA officers as needed. Be prepared to terminate towing operations if needed.

Tow Plane Operations

- Emergencies
  - Rule #1 – If aircraft control is ever in doubt, IMMEDIATELY PULL THE TOW RELEASE HANDLE!
  - Takeoff:
    - If there is insufficient performance or a flight control issue:
      - Pull tow release handle
      - Maneuver to left side of runway if stopping
      - Be cognizant that glider is 200’ behind
    - A particularly hazardous situation can develop rapidly if glider climbs too high, pulling tow plane tail up and nose down. The only way for the tow pilot to extricate himself is to immediately pull the tow release handle. If the elevator control ever reaches the aft stop, release tow rope immediately.

Sunflower Airport Operations

- Runway positioning
  - Gliders stage on east half of runway
    - Keep west half of runway open for landing aircraft

Sunflower Airport Operations

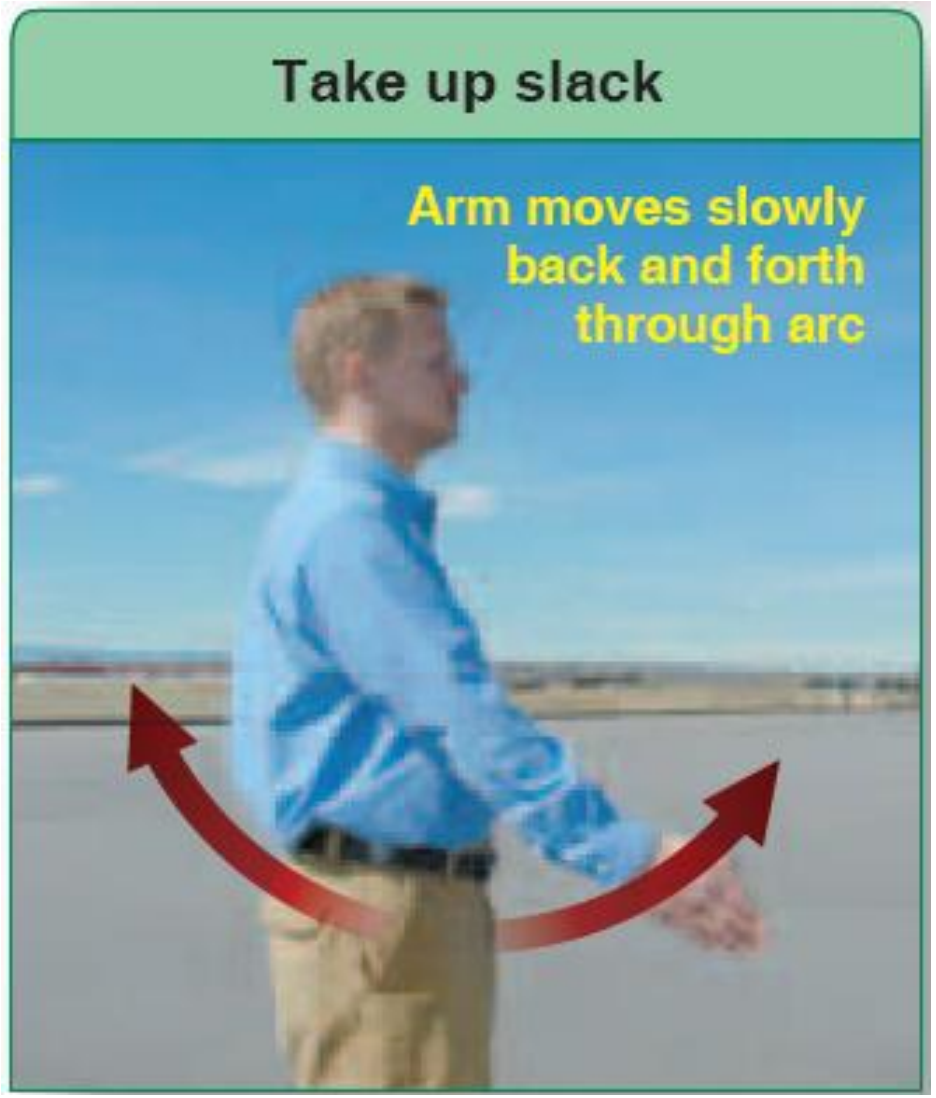
- Line crew coordination:
  - Ideally there are 2 line crew
    - 1 at glider wing
    - 1 on runway edge forward of tow plane to relay signals
  - With only 1 wing runner
    - Watch wing runner through rear view mirror for signals
  - With no wing runner
    - Requires clear brief with glider pilot on positioning and signals
    - Glider pilot or tow pilot will have to hook up
    - Upwind glider wing should be down
    - Radio or glider rudder waggle will indicate ready for takeoff

Sunflower Airport Operations

- Ground signals
  - Ready for takeoff – At Sunflower the glider pilot signals the wing runner that he is ready for takeoff with a thumbs up. Once that signal is given the wing runner then controls the launch sequence by raising the wing, signaling to take up slack and then signaling to takeoff. If at any point before takeoff, the wing runner sees that the launch sequence should stop, he will place the wing back on the ground, signaling the tow pilot to stop.

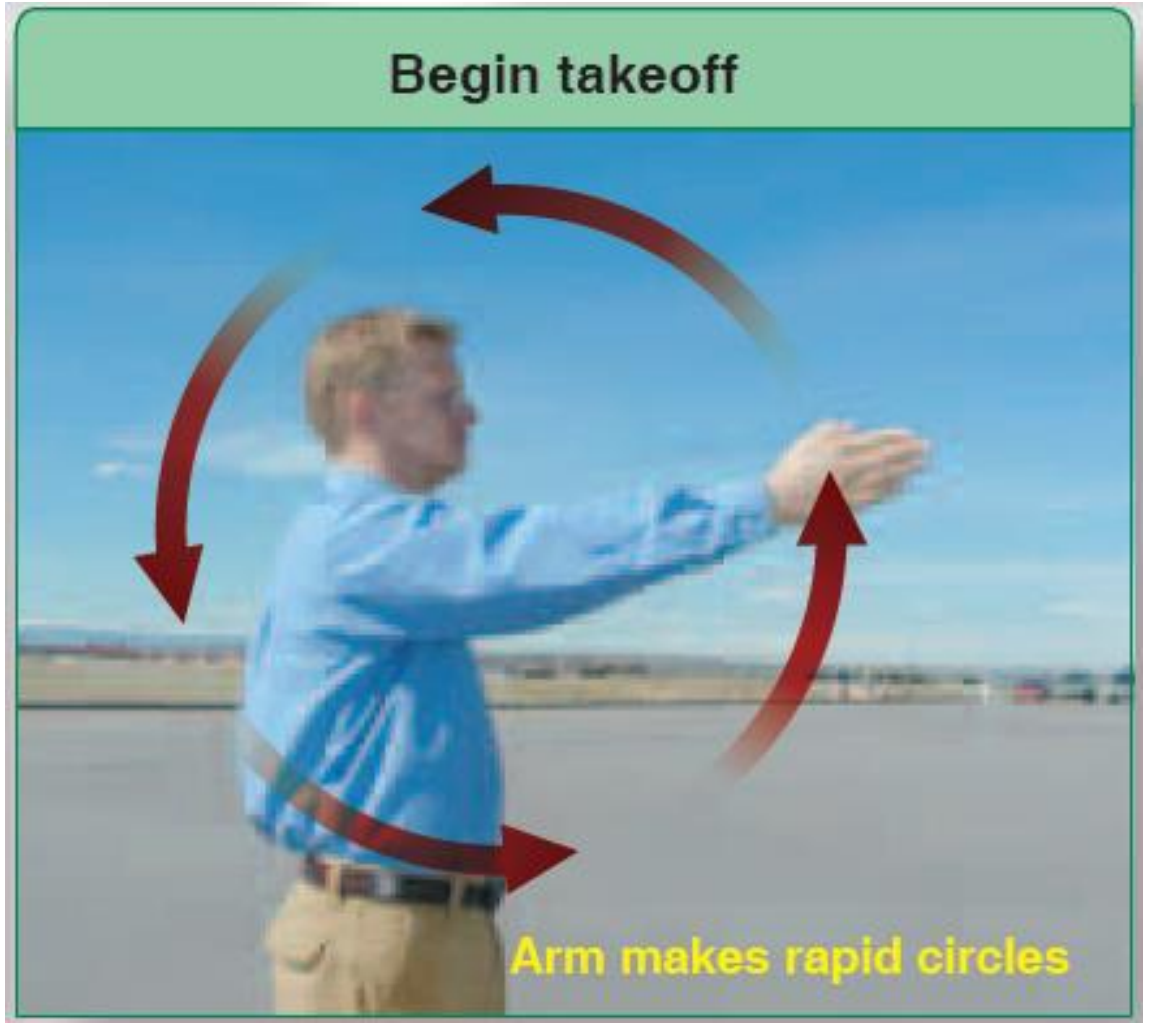
Sunflower Airport Operations

- Ground signals
  - Take up slack – The tow pilot should verify he is ready for takeoff, announce takeoff on the radio, and slowly move forward to take up slack in the tow rope



Sunflower Airport Operations

- Ground signals
  - Takeoff – The tow pilot should smoothly advance power and begin takeoff

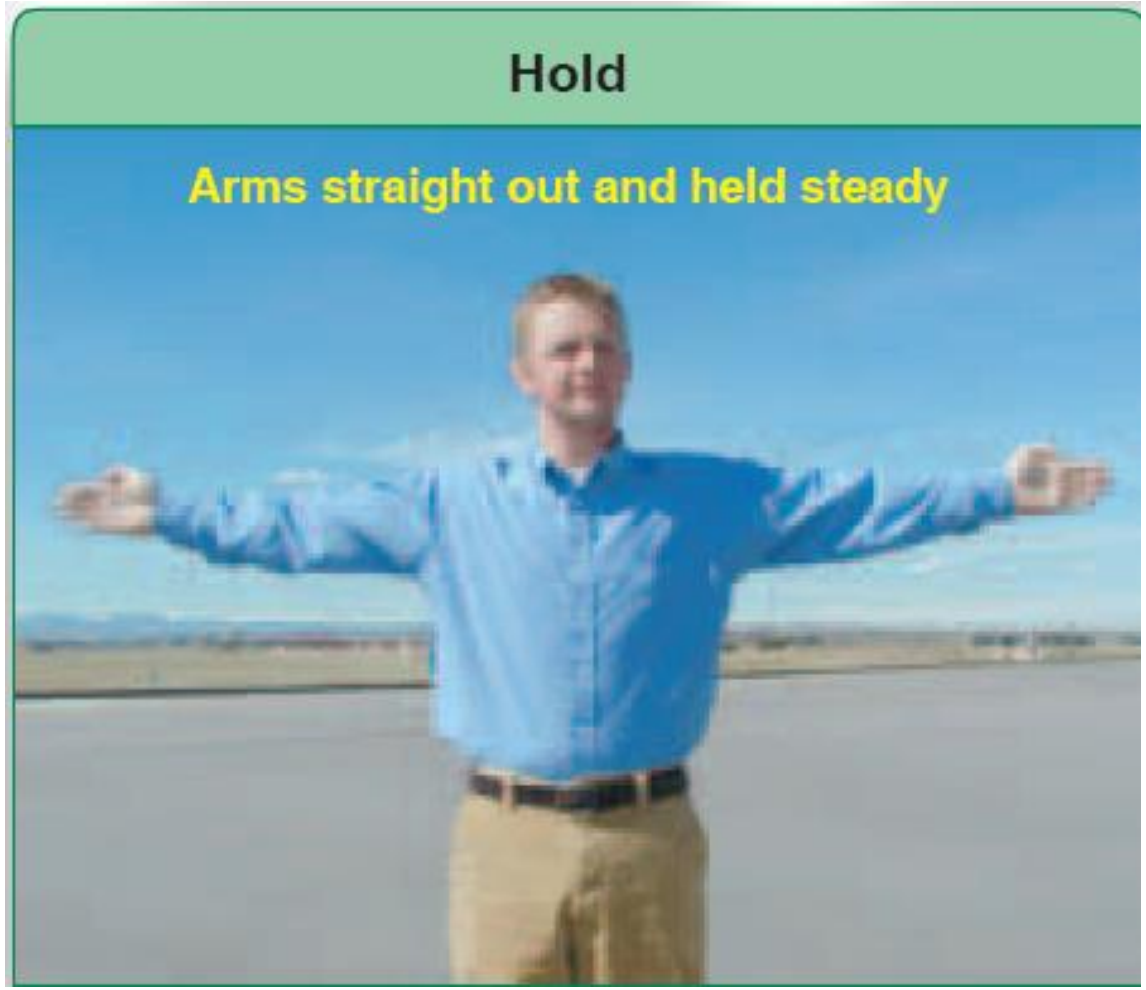


Sunflower Airport Operations

- Ground signals
  - Move forward – Both hands repeatedly drawn to lineman in a “come forward” motion. Sometimes a second lineman may use this to advance the tow plane so there is not excessive slack. This can be done in the interest of efficiency to minimize the launch sequence once the glider pilot is ready

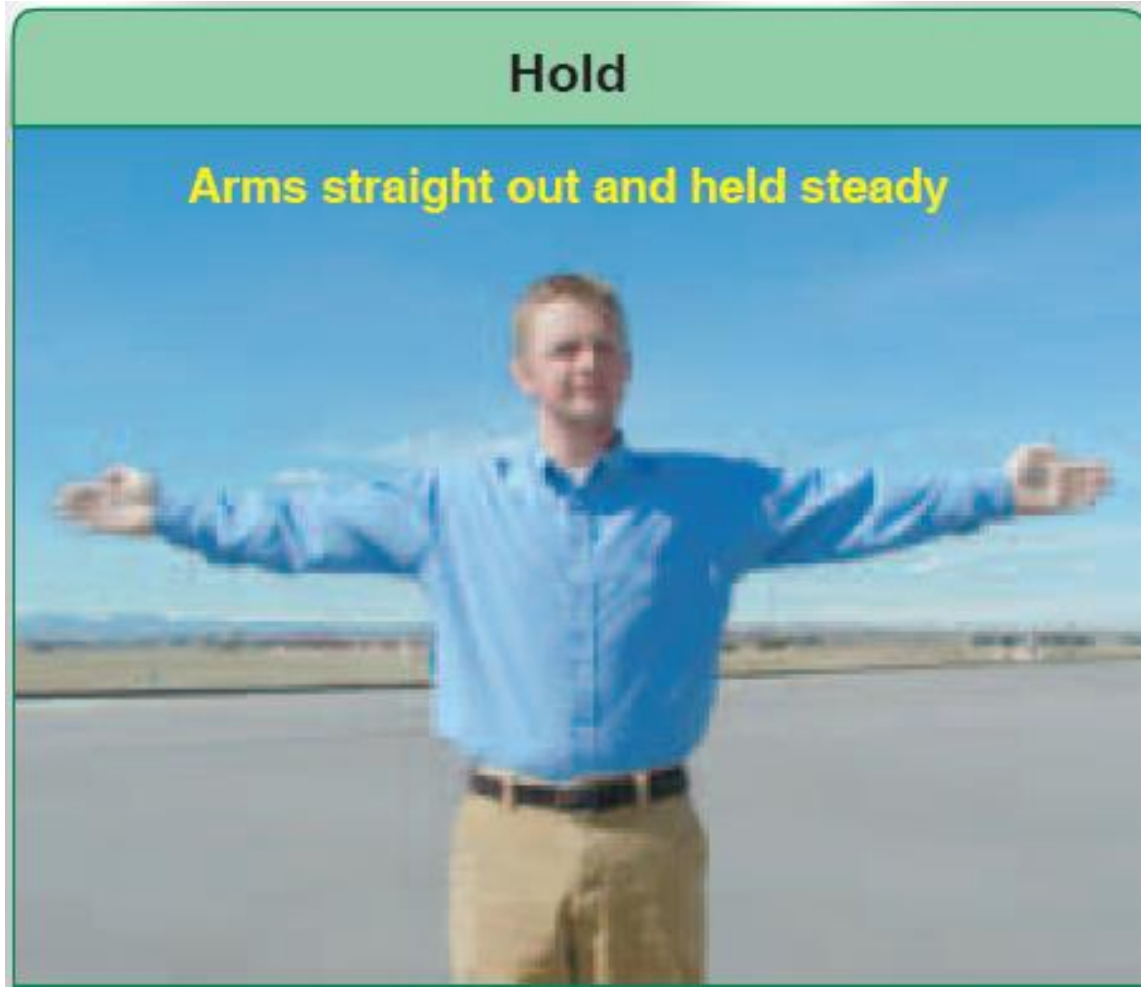
Sunflower Airport Operations

- Ground signals
  - Hold – Indicates the tow plane should hold position



Sunflower Airport Operations

- Ground signals
  - Stop – Indicates the tow plane should stop



Sunflower Airport Operations

- Ground signals
  - Stop operation immediately – Indicates the tow plane should stop, generally with greater urgency

Sunflower Airport Operations

- Ground signals
  - Release towline now – Indicates the tow plane should release the tow rope

Sunflower Airport Operations

- Plan climb profile before takeoff
  - If on tow maneuvering is planned, try to be wings level with long straight leg at 1000’ AGL
  - Keep climb pattern inside of all paved roads (within about 1 ¼ mile of runway)
  - Plan to be at release altitude near upwind edge of airfield
- Do not tow WSA/KSA gliders above club wind limits
  - Club wind limits are 20 mph continuous/25 mph gust

Tow Lines

- Tost & Schweizer rings
  - Use the correct ring for the glider!
  - Using incorrect ring can result in failure to release
  - There are Schweizer ring tow ropes, Tost ring tow ropes, and Schweizer to Tost adapter lines

Tow Lines

- Inspection – check for:
  - Ring condition
  - Fraying. Minor fraying is acceptable, broken strands is not
  - Abrasion.
  - Broken strands
  - If tow rope is not acceptable, replace with a better one or make a new one

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Tow Lines

- Sunflower tow ropes
  - Tow ropes are stored in wagon
  - Pull to unroll, use cordless drill to roll up
  - Bulk roll of 3/8” hollow braid polypropylene is kept in hangar 1 to make tow ropes
    - 1200 to 1500 lb estimated breaking strength
  - Instructor should demonstrate making new tow rope
    - 200’ long
    - Splicing needle is stored in wagon
    - Weave rope back in and out 3 times
    - Use electrical tape to reduce abrasion at diameter increase

Glider Flight Training

- Tow pilot candidate must receive a logbook endorsement for 61.69(a)(3)
- KSA has further requirements including:
  - Hold an FAA glider rating or fly as a student in a glider on a minimum of 3 aero tows
  - Conduct the following in a glider with an instructor:
    - Takeoff
    - Climbs
    - Turns on tow
    - Boxing the wake
    - Slack line recovery
    - Observe glider problem signal from tow plane
    - Observe emergency release signal from tow plane
    - Normal tow release

Tow Plane Flight Training

- Tow pilot candidate must observe a minimum of 1 tow conducted by a qualified tow pilot
- Tow pilot candidate must conduct a minimum of 5 tows as the sole manipulator of the controls while accompanied by a qualified tow pilot

Tow Plane Flight Training

- The following table is from the tow pilot qualification syllabus. Some items are explained in the following slides

Qualified Tow Pilot Initials:						
Date:						
ITEM	Flight 1	Flight 2	Flight 3	Flight 4	Flight 5	Flight 6
Tow rope selection, prep., hookup						
Tow plane positioning on ground						
Radio calls						
Take-up slack						
Advancing power						
Takeoff roll						
Climb						
Glider maneuvers on tow						
Inflight signals						
Release						
Power management in descent						
Flap usage						
Landing position & towrope considerations						
Position for next tow or ready position						
End of day duties						

Tow Plane Flight Training

- Radio calls
  - It is best practice to announce takeoff and normal traffic pattern position calls over the radio.
    - For example: “Sunflower traffic, towplane 97M departing 17 with glider in tow, Sunflower”
- Take up slack
  - Before this point, the tow pilot should ensure he has completed his takeoff checklist and is ready (flaps, trim and mixture are critical items)
  - Move forward very slowly, watching lineman for takeoff signal

Tow Plane Flight Training

- Advancing power
  - When the takeoff signal is given, the tow pilot should smoothly advance power over approximately 3 to 5 seconds.
    - This results in a smooth acceleration without jerking the glider forward or excessive dragging on a nose skid
- Takeoff roll
  - Slowly drift toward centerline
  - After takeoff smoothly adjust to requested climb speed
  - Be prepared to release tow rope immediately if tow plane nose pitches down uncontrollably

Tow Plane Flight Training

- Normal release
  - Tow plane should turn left and glider should turn right to increase separation
- Descent, after glider is clear
  - Reduce throttle to bottom of green arc on manifold pressure gage
  - Lean mixture for descent
  - Retract flaps
  - Descend at 140 Kts
- C-175 flaps
  - Aircraft is nose heavy and can run out of elevator authority at high flap deflections and slow speeds
  - Flaps 20 (2^{nd} notch) is recommended maximum flap position for landing

Tow Plane Flight Training

- Landing
  - Keep good watch out for landing gliders and give way
  - Tow rope remains attached for landing. This requires awareness to remain sufficiently high over the trees to avoid snagging the rope.
  - Once clear of trees, throttle back as necessary for a normal landing on the west ½ of the runway
  - Watch out for gliders landing and blocking runway. Be prepared to go around if necessary

Tow Plane Flight Training

- End of day duties
  - Release tow rope near wagon (and verify it is retrieved)
  - Fuel aircraft full
  - Leave tow tickets in envelope or aircraft
  - Wash windshield
  - Push towplane in hangar
    - Use wing-walkers to avoid damage
  - Lock hangar if last one out