

Northern California Soaring Association

Tow Pilot Manual

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Approved By: NCSA Board of Directors

Section 1: Qualifications and Approval

New Tow Pilot Training

A prospective tow pilot must be vetted and approved by the Chief Tow Pilot. The Chief Tow Pilot or his designee will review the candidate's experience and qualifications and will train the candidate as follows:

- Initial phone screen where we review the candidate's background, the job, and the training process itself
- Soaring Safety Foundation online tow pilot training course
- Ground and flight training in gliders meeting the requirements of 61.69 (required of all candidates for Byron familiarization even if they have prior towing experience)
- A dual flight with another qualified tow pilot to do at least three simulated glider tows meeting the requirements of 61.69 (only for candidates with no previous experience towing). The following will be covered:
 - Hook up and launch procedures
 - Normal high tow profile off runway 30 keeping glider in glide range of airport
 - Normal and steep turns on tow
 - Box the wake
 - Slack line
 - Release including minimizing glider/towplane collision risk
 - Descent and pattern entry
 - Normal high tow profile off runway 23 keeping glider in glide range of airport
 - Pattern tow profile off of runway 30 and off of runway 23
 - Premature termination of the tow
 - Rope break
 - Aborted takeoff (briefing only)
 - Rock off
- Candidate joins NCSA to get on the insurance
- Pawnee checkout consisting of the candidate's having read the POH, TCDS, and notes, ground training, and supervised flights (required of all candidates even if they have previous Pawnee experience)
- The candidate tows the Chief Tow Pilot or his designee for his/her first tows at Byron. We prefer to do this midweek to minimize traffic conflicts.

- The candidate gets on the rotations and on the appropriate email lists. An announcement is sent to the board, tow pilots, and club.

Pilot Experience and Qualifications

NCSA tow pilots must have:

- NCSA membership
- Private Pilot privileges or better in Airplane Single Engine Land
- 100+ hours PIC in Airplane Single Engine Land (61.69)
- Third Class or better medical certificate or BasicMed course completion certificate
- Current Flight Review (61.56)
- **Tow Pilot Currency (61.69):**
 - **Within the previous 24 calendar months:**
 - **Three glider flights as PIC OR**
 - **Three actual or simulated tows while accompanied by a qualified tow pilot**
- Tailwheel endorsement or be “grandfathered” into tailwheel airplanes (61.31(i))
- Glider towing endorsement (61.69)

Section 2: Operating Procedures

This section discusses towplane operating procedures and, in many cases, provides procedures that are specific to N6470Z. If there is a disagreement between the contents of this manual and the contents of the AFM/POH for N6470Z, then the AFM/POH is controlling. If there is a disagreement between the FARs and the contents of this manual, then the FARs are controlling. This discussion assumes that the towplane has conventional landing gear. The following is intended to be a guide to NCSA-unique towing procedures and is not an exhaustive description of all towing considerations. Refer to the [Glider Flying Handbook](#), Chapters 7 and 12, and to the [Towpilot Manual](#) by Burt Compton for additional information. Another excellent reference is [Aerotowing Gliders](#) by John Marriott. Numerous other texts and websites exist.

Tow Pilot Safety Responsibilities

The Tow Pilot is responsible for the safety and proper operation of the towplane and coordination with ground crew during hook up operations. The Tow Pilot shall not leave the pilot's seat while the prop is turning. Please do not hand prop or jump start the airplane. The Tow Pilot may refuse to perform a tow for any reason. During the tow, the Tow Pilot is in charge of the flight. It is an NCSA requirement that tow pilots must meet the currency requirements of FAR 61.57 (carrying passengers). This can be regained by performing 3 takeoffs and full stop landings within 90 days prior to towing a glider.

N6470Z Description

The NCSA towplane is a 1962 Pawnee (PA-25) made by Piper Aircraft. It has a Lycoming O-360 carbureted 4 cylinder engine that generates 180 HP. It is a conventional gear aircraft with a steerable/full castering tailwheel. The engine has an Impulse Coupler on the left magneto only.

Preflight

The tow pilot shall conduct a thorough preflight of the towplane. It is particularly important to inspect the tires for condition and inflation, drain water from the gascolator (not while inside the hangar), and check the condition of the landing gear attachments, tailwheel springs, tost hook, brakes, and tow rope.

N6470Z's tailwheel is steerable with full castering detents. These features improve ground handling by providing lateral resistance to weather vaning. Astute tow pilots should be cognizant of these features working correctly.

Fuel

If the fuel tank is not appropriately filled, refuel before flight operations commence. Do not top off the tank. Instead, add fuel until $\frac{1}{2}$ inch remains between the cap and the top of the fuel.

Remember to account for the resulting (slight) decrease in endurance. You should not run the engine any longer than 2.0 tach hours before refueling if you start with fuel $\frac{1}{2}$ inch below the cap. If you fuel in the middle of an operating day, then release the tow rope at the staging area or on a taxiway before taxiing to the fuel station. If possible, arrange for the ground crew to take care of the rope after you release it.

Please refuel at the end of each operating day to avoid delays at the start of the next operating day.

Oil

The oil level should be maintained between 5.5 and 6.5 quarts as measured when cold. If the oil level is found below 6 quarts at the start of an operating day, the tow pilot should add oil to bring the level up to at least 6 quarts. Oil is located on the shelves next to the towplane. A funnel is located on top or inside of the slop pail sitting on the shelves.

Tow Ropes

Tow ropes are located on the workbench and in the golf carts. Once the tow rope is attached to the Tost Hook, it drags freely (i.e., does not retract) from the back of the towplane until it is released. Do not attach a tow rope prior to taxiing to the staging area lest it get caught on something during the taxi. Additionally, beware the barbed wire fences just before the thresholds for runway 23 and 05, as they may snag the rope. The tow pilot must visually inspect the tow

rope prior to the first tow of the day and following any situation that he thinks compromised the tow rope.

Starting Procedures

The engine is started with the left magneto only. Turn on the right magneto after engine start. Recommended starting procedures vary slightly depending on whether the engine is warm or cold. The airplane does not have a primer pump.

Engine Cold

Pump the throttle 4 or 5 times (2 or 3 times in warm weather) and then open it ¼ inch.

Engine Warm

Pump the throttle 1 time and then open it ¼ inch.

The engine in N6470Z should start easily. If it does not, then something is wrong. Contact the Crew Chief.

Taxi and tow rope

N6470Z has conventional gear so it is important to hold the stick properly during taxi. Controls should be set to “climb into or dive away” from the wind as required. Be vigilant for ground personnel or obstructions. Perform “S” turns as needed for visibility.

Remember that there are snagging hazards if you are taxiing with the tow rope attached. This includes people, golf carts, and other movable objects. There are many plastic taxiway stanchions that can snag the rope. The snagging can damage the stanchions. Try to avoid this by using buttonhook turns. When a snag is unavoidable, taxi slowly so as to minimize rope wear.

When you release the tow rope on a taxiway, let the ground crew know and get an acknowledgement that they'll pick it up. This would happen when you go to the fuel island or at the end of the day. If they're obviously busy, or if you get no acknowledgement, it may be best to briefly shut down the tow plane, roll up the rope, stow it on the turtledeck, and proceed.

Runup

Perform the daily runup in accordance with standard operating procedures. It is a good operating practice to wait until the oil temperature is $\geq 100F$ before performing the runup. As a minimum, check magnetos, carburetor heat, controls (for freedom of movement), brakes, fuel quantity, and the fuel shutoff valve (verify on).

First Flight of the Day

NCSA encourages tow pilots to make a check flight each towing day to check out the towplane's systems and to re-familiarize themselves with the plane's handling. A simple pattern may be sufficient. If the tow pilot has not acted as pilot-in-command within the last 90 days [current to carry passengers], then now is a good time to do your three landings.

Billing

Billing is done by the glider's release altitude. On the tow sheets (located on the hangar's shelves), enter this altitude in MSL. For a pattern tow, enter C (for circuit). Retrieves are billed by round trip tach time from block out to block in.

Staging

Never stage the towplane on gravel! This can damage the propeller tips.

Calm wind operations are conducted from the first turnoff (NOT the threshold, which is the zeroth turnoff) on runway 30. In this case, the towplane stages on the taxiway just before the hold short line. Always exercise extreme vigilance when taxiing near personnel or equipment. The tow pilot or the glider pilot may request a threshold departure, as may happen when it is hot.

The second most common operating configuration is from the threshold of runway 23. In this case, the towplane stages in the runup area serving runway 30 and runway 23. While parking here, always ensure that the tow rope is out of the way of other airplanes in the runup area and on the taxiway. This might require that you exit the towplane and reposition the rope.

Always be rope-aware. A moving rope presents a hazard to personnel and equipment. While parking, ensure that the rope is clear of all taxiways, personnel, and equipment as often as is practical. Consider asking the Field Manager for help with rope management.

Always maintain good situational awareness even while sitting in the staging area in an idle towplane. Form a mental picture of traffic that is in the pattern, and ensure that you acquire this traffic visually before you consider staging on the runway. You are a line of defense. Do not rely on the ground crew's or the glider pilot's assessment of traffic.

Glider Launch Procedures

When the wing runner signals that they are ready for you, start up and taxi to a position safely in front of the glider to be towed. With your engine at idle, the wing runner will reposition the tow rope and attach it to the glider.

The ground crew should not handle the rope while the tow plane is moving. If you observe this, then please stop the tow plane until the wing runner puts the rope down

NCSA requires a successful radio communications check. This may be initiated by either the glider or the towplane. If the communications check is unsuccessful, the launch shall be terminated. Successful radio communications are an NCSA pre-launch requirement.

With all personnel clear of the glider (not in front of the wing) the wing runner or pilot may give the signal to “take out slack”. The wing runner may signal when to stop by holding both arms out to the sides of his body or above his head (standard SSA glider signals). However, in N6470Z, it is easier to view the rope by looking over your shoulder or in the mirrors (while also paying attention to your forward track). As you taxi forward, observe the tow rope going taught at the attachment point near the tailwheel to determine when all the slack is out. After stopping, confirm the pre takeoff check list and wait for the takeoff signal.

With the glider wings level, the glider pilot should radio his readiness for takeoff and waggle his rudder. The wing runner should give his takeoff signal. NCSA does a lot of instructional flights. Students often get confused, both pilots and wing runners. Do not feel obligated to take off. If there is any question about readiness, get on the radio and make them get it right. For safety reasons (dust devils, wind gusts) do not climb out of ground effect too soon. Hold the plane in ground effect as you accelerate to climb speed and then begin the climb. Do not zoom up. It is extremely difficult for a new student to follow this type of maneuver. The need for acceleration in ground effect will be even more noticeable for heavy, two-place gliders. Avoid any abrupt changes in your climb angle.

Do not perform a takeoff if the glider wing is down. Less experienced pilots often make this mistake. Wing runners assume that no takeoff will occur while they are holding the wing down. Occasionally, takeoffs will be made with the wing of the glider resting on the ground (unassisted takeoff), but you must be informed of this in each individual case. Also, some pilots like to takeoff with partial spoilers. These are all exceptions that must be communicated to the tow pilot and wing runner before attempting to launch.

Unless you are specifically briefed to do something different ahead of time, never start your takeoff unless:

1. Glider wings are level
2. Spoilers are closed
3. Canopy is closed
4. All line crew are clear (nobody is standing in front of the wing)
5. You get the radio call (“Standby for rudder” or “Ready for takeoff”)
6. You see the rudder wag and/or Wing runner gives takeoff signal
7. The runway and pattern are clear

If the takeoff is aborted, pull off to the left side of the runway, if possible. Do not stop short; keep the towplane rolling so the glider does not rear-end the towplane. The glider should pull off to

the right, but as some gliders lack directional controllability at low speeds, you cannot depend on the glider pilot being able to point the glider where he or she wishes.

If you feel the tow line break during takeoff, even though you may believe you can stop the towplane before you reach the end of the runway, continue the takeoff so the glider will have a clear shot at an emergency landing (rollout without hitting the towplane). Emergencies rarely happen, but they do happen, so you should constantly keep in mind what you would do if one did occur.

During takeoff, be especially alert to the possible emergency situation that may require pulling the emergency release handle. An example of such a situation is a tow pilot's full deflection of any towplane control. Other situations will require a judgment call. If there is doubt about a safe outcome for the towplane and pilot, then pull the emergency release.

Climb

Climb at full power and adjust attitude to maintain tow speed. Do not allow the glider to overpower the towplane. This will require, at times, heavy rudder control pressures. This is especially true during tow maneuvers.

When towing gliders that are unfamiliar to you, inquire as to what tow speed they desire. Glass ships carrying ballast will want a higher than normal tow speed. Unless otherwise stated, assume 75MPH/65 knots for club ships. This might require flying 70 knots indicated due to calibration issues at low airspeeds for the towplane. It is usually better to tow slightly fast than slightly slow,.

If you experience a power loss, engine failure, or other emergency after becoming airborne, signal the glider by rocking your wings and transmitting "Glider! Release, Release, Release!" on the radio. Then maintain safe airspeed and look for a safe place to land. Execute engine restart procedures, if able. If, after the glider has released, you find you still have partial power, use your own judgment as to whether you will be able to return to the gliderport or be forced to land in the first available field.

When departing runway 30, do not drift into the skydiving drop area. This might require a crab into the wind or even an offset away from the skydiving drop area. If the skydivers are abnormally close to the runway, then this offset is mandatory.

During climb, you should NEVER FLY TO A POSITION FROM WHICH THE GLIDER CANNOT RETURN TO THE GLIDERPORT. Fly along straight legs, turning only when necessary to keep from getting too far from the gliderport. Turn with bank angles of between 15 and 20 degrees. Steeper banks are hard for students to follow, while shallower banks take too long to make the turn. Students require long straight legs to perform their practice maneuvers.

A standard high tow profile off of runway 30 is to fly straight out until 700 feet and then fly a right crosswind leg to the Byron Highway. Once on the far side of the Byron Highway, turn left to fly parallel to the highway until abeam the town of Byron, at which point you should turn left to fly toward the radio towers on the far side of the Los Vaqueros Reservoir.

A standard high tow profile off of runway 23 is to fly straight out until 500 feet and then make a left 360 degree turn and fly toward Brushy Peak. When clear of the skydive area, make a right turn to track toward the Los Vaqueros Reservoir.

While towing, the tow pilot does not determine the release point of the glider. The glider pilot is responsible for determining when to release.

When descending, but prior to pattern entry, please maintain 2000 RPM to mitigate possible shock cooling.

Be aware that pulling the “emergency” release can be dangerous for the glider. The rope can tangle the glider control surfaces. The emergency release is for emergency purposes only.

If spoilers are seen deployed, use discretion when signaling the glider by fanning (wagging) the rudder, use the radio instead. In general, this signal should only be used at a minimum altitude of 1000 feet AGL due to the tendency of glider pilots to mistakenly interpret this as a request for immediate release. If the glider configuration is in question, make a radio call or wait for sufficient altitude prior to fanning the rudder.

Landing

Landings at Byron often require significant attention and decision making. On the weekends we share the pattern with local airplane pilots and visiting student pilots. We also have a local skydiving operation with a jump plane known as “Elevator”. For expediency, the jump plane will often takeoff and land in opposite directions regardless of the wind. Although we have the option of performing non-standard patterns, this may not be safe with others flying standard patterns. This is less of an issue with midweek towing when there is less traffic.

Pattern Tows can be a challenge for a tow pilot. This is especially true when the winds are strong and we need to use the same runway as the glider. If winds are light, it is often best to use the “other” runway. If winds are strong you may want to encourage the glider to release at 1300 AGL so that you can more easily land first. Similar complications exist for Rope Breaks. Don't feel bad about using your engine to loiter until the runway is clear. Do not hesitate to decline a request for a Pattern Tow if you think that conditions put a safe outcome in doubt. For example, this might be the case if the pattern is already full of airplane traffic.

Weather Considerations

Our most common weather considerations are the winds. Winds are often from the southwest and can get very strong. This will push everybody onto runway 23 which then gets very busy. Another consideration is density altitude during the summer months. Towing a heavy Grob 103 with 2 adult passengers may require more runway than is comfortable. You may need to abandon the first intersection takeoffs and instead go full length on runway 30.

Crew rest guideline

Towing gliders can be demanding and tiring. The following tow quantities are not required minimums. If you feel you're getting tired, say so and take a rest. If you give ops a heads up a tow or two in advance, you'll almost never get push-back ... but in any case don't hesitate to immediately stop any time you feel you're not fit.

Cool days (less than 90 deg F forecast at the Byron airport)

- If the tow pilot scheduler anticipates 20 or more tows, he'll do his best to find a relief tow pilot who takes over approximately at tow #15.
- If a tow pilot accumulates 20 tows on a cool day, then 1/2 hour mandatory crew rest, then 6 max additional tows.

Hot days (90 deg. F or more forecast at the Byron airport)

- If the tow pilot scheduler anticipates 15 or more tows on a hot day, he'll do his best to find a relief tow pilot who takes over approximately at tow #10.
- If a tow pilot accumulates 15 tows on a hot day, then 1/2 hour mandatory crew rest, then 6 max additional tows. If there's no suitable resting place (a cooler spot, in the shade, preferably air conditioned), no additional tows after 15.

Retrieves

Gliders routinely make safe landings at 'other' airports, and they are routinely brought back home with an aero retrieve. It's safe and reasonable!

That said, there are aspects of retrieves that can make them more problematic than a tow at the home airport. These need to be considered so the retrieve doesn't become (another) local legend, or worse yet, damage aircraft so they are not available to the soaring community afterwards.

Gliders can easily land in places where an aero retrieve would be problematic or illegal. The phone call for a retrieve tends to come at the end of the day. The pilots are going to be tired, and there may not be enough daylight. The tow pilot may (or may not) have the resources or time to do the minimal required cross country planning required by regulation and common sense. And finally, there's a big variation in the experience of the potential tow pilots and glider

pilots. Everyone should bear in mind that the alternative, a ground retrieve, will be a hassle, but doesn't need a safety/sanity check.

Retrieves may only be done from these airports. If the airport is towered, then ask the glider pilot to call the tower explaining that a retrieve is needed. This gives the tower insight into what is undoubtedly an unusual situation for them. It also allows them to provide guidance.

Tracy - KTCY

New Jerusalem - 1Q4

Rio Vista - O88

Napa - KAPC, tower, 707-255-1533

Buchanan (Concord) - KCCR, Tower 925-685-5743

Stockton - KSCK - Tower - 209-982-4667

Livermore - KLVK, Tower, 925-443-0666

Nut Tree (Vacaville) - KVCB

Modesto - KMOD - Tower, 209-524-6985

1] On days when cross country activity is especially likely, backschedule a retrieve timeline and let the pilots know what time to call by. Starting with sunset, add up the return trip, time at destination airport ½ hr min, outbound trip, time at home airport prior to departure, including fueling, finding ropes, etc. You will find this adds up to more than you'd think. Give the pilots your phone number.

2] If a retrieve is needed, praise the almighty for a welcome break from routine tows. Get the best contact info you can obtain for the errant pilot. Pilot name, pilot cell phone number, airport, location on airport. This said, if the day has been long and you're already knackered, don't hesitate to decline.

3] Plan the flight carefully. Pawnees are very short-legged, start with full fuel. If you haven't already, backschedule a timeline conservatively from sunset: Return trip, time at destination airport ½ hr min, outbound trip, time at home airport prior to departure, including fueling, finding ropes, etc. You will generally find this adds up to more than you'd think. If the answer is marginal, say "No". Hopefully you have foreflight or equivalent, but be sure to brief yourself properly on the route and on the destination airport.

4] Write down the tach time when you leave the fuel pump, retrieves are billed by block time.

5] Remove the towrope and stow it in the airplane before you leave Byron. Bring 2 ropes and a handheld radio.

6] If possible, overfly the destination airport and verify the position of the glider. Look again, maybe there's more than one.

7] Land, taxi to the glider, get out and talk to the glider pilot. Agree on a takeoff plan, including hookup, launch, climbout, probable route, radio frequency, and release. Caution the glider pilot to be extra careful to obtain super-conservative glide before release. Hopefully the glider pilot is located at a tenable takeoff spot, if not, you'll probably have to help push the glider to someplace that is reasonable. Using the towplane to tow the glider around the airport on the ground is fraught with peril.

8] If there's more than one glider needing a retrieve, evaluate the airport for the sanity of landing and taxi-ing with a trailed rope. You need to consider wires, fences, taxi obstructions, and airport social acceptability. If there is any doubt in your mind, do not hesitate to return to the home airport after glider release, roll up the rope, and go back to the retrieve airport with the rope safely stowed.

8] The takeoff plan depends on the glider pilot, the level of activity at the airport, and the type of glider.

- Ideally you'll unroll the rope, hook the rope to the towplane, taxi out, and the glider pilot will push the glider out, hook up the glider, and strap in. This can take a long time!

- If the glider pilot is especially confused or knackered, you may end up shutting the towplane down on the runway and assisting the glider pilot

- If the glider has a CG hook the wing-down takeoff can be challenging

9] Some sort of overhead departure is highly recommended to keep the glider (and towplane!) in-range of a safe airport. Always keep the glider in glider range of a suitable landing site during a cross country tow.

10] Beware of power reductions on tow, the tow plane is draggy and the glider is slippery. Power reductions should be super gradual and in steps. The glider tends to catch up with the towplane, very disconcerting. It's best to maintain a continuous slight climb after the target cruise altitude is attained.

11] Everyone should stay on the takeoff airport CTAF until glider release. If it's a towered airport, then the tow pilot should initiate a frequency change to Byron's CTAF once the tower advises that frequency change is approved. The tow pilot must always verify that the glider is on the new frequency.

12] When the glider releases, the glider pilot may fly it back home much faster than you think ...

13] Write down the tach time after you land at the home airport. Did we mention that retrieves are billed for block time?

Parking

Remember to release the tow rope before you taxi back to the hangar. Depending on ground crew workload you may need to release the rope, park temporarily, roll up the rope, and continue to the hangar. When pulling the airplane back into the hangar, do not use the yellow centerline as a guide because it is offset relative to the door opening. Instead, use the blue tape. Make sure that you pull the towplane back all the way to onto the chocks because this keeps it out of the way of the golf carts.

For paperwork, email (ljsuter@gmail.com) or text (925-321-3972) a copy of the tow sheet to treasurer Larry Suter. Additionally, make an entry in the log located in the black pouch behind the pilot's seat.