

LAS VEGAS VALLEY SOARING
ASSOCIATION

PIPER PAWNEE

TOW PILOT GUIDE

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Preparation

NOTES

1. If you are authorized to drive on the airfield, you can save some time by entering the ramp from the west and checking the Pawnee oil level before proceeding to the club house.
2. Engine oil changes are required every 50 hours. This time may be exceeded by no more than 10%. Before takeoff, ensure you know when the oil change is due and do not exceed this flight time

- Fuel Pump Credit Card – Obtain
- Tow Pilot Log – Obtain
- Headset/mic – Obtain
- Squawks – Review
- Mx Due Dates/Times – Note
- Weather
- NOTAMS
- Security NOTAMS

Preflight

- Cockpit
 - Mags – Both Off
 - Master – Off
 - Nav Lights – Off
 - Radio –Off
 - Transponder -- Off
 - Control Locks – Removed/Undone
 - Trim – Adjust (neutral)
 - Flaps – Cycled, then Down
 - Tow Release – Activate
 - Fuel Shutoff Valve – On (Down)
 - Seatbelt and Shoulder Lock – Check
 - AROW -- Available
 - Fire Bottle aft of seat – Charged/Secure
 - Tow Pilot Log – Annotate Beginning Tach & Fuel Level
- Left Side
 - Left Fuselage – Check
 - Static Port – Check
 - Battery Box Cover – Secure
 - Horizontal Stab – Check (Elev Hinge Bolts)
 - Tail Surface Flying Wires –Check (Taut)
 - Elevator – Check

- Center Empennage
 - Vertical Stab – Check (Rudder Hinge Bolts)
 - Rudder – Check
 - Nav Light -- Check
 - Tailwheel – Check
 - Tailwheel Assembly –Check
 - Tow Release Assembly -- Check
 - Tie Down – Remove
- Right Side
 - Elevator – Check
 - Horizontal Stab – Check (Elev Hinge Bolts)
 - Tail Surface Flying Wires –Check (Taut)
 - Battery Box Cover – Secure
 - Right Fuselage – Check
 - Static Port – Check
- Right Wing
 - Flap – Check
 - Aileron – Check
 - Nav Light – Check
 - Tie Down – Remove
 - Right Wing Surface – Check
 - Stall Warning Vane – Check
 - Right Wing Strut -- Check
 - Tire – Check
 - Brake – Check
 - Brake Pad Wear Indicator
 - Landing Gear – Check

- Nose
 - Engine Right Side – Inspect
 - Carb Heat Box
 - Right Cowl Fasteners – Secure
 - Propeller – Inspect
 - Spinner – Secure
 - Generator Belt – Tight
 - Air Filter – Check
 - Engine Left Side – Inspect
 - Left Cowl Fasteners -- Secure
 - Oil Level – Check (Don't Over-tighten Dipstick!)

NOTE

Add oil if below 9.5 quarts. More than 10 quarts causes venting through the breather.
See limitations on page 30.

- Fuel – Visually Check (39 Gallons Max)
- Fuel Cap – Secure
- Fuel Strainer – Check (DON'T drain on ramp)
- Left Wing
 - Landing Gear – Check
 - Tire – Check
 - Brake – Check
 - Brake Pad Wear Indicator
 - Left Wing Strut -- Check
 - Left Wing Surface – Check
 - Pitot Tube Cover – Remove (if installed)
 - Pitot Tube – Check

- Tie Down & Combo Lock – Remove
- Nav Light – Check
- Aileron – Check
- Flap – Check

NOTES CONCERNING FUEL

1. The pilot is responsible for monitoring fuel state and deciding whether sufficient fuel remains for safe tow ops.
2. The hash line on the fuel gauge is 7.5 gal. TOTAL in the tank when the Pawnee is in a 3-point attitude. It approximates minimum VFR fuel reserves. Do **NOT** take off with the fuel gauge indicating at the hash mark.
3. Use caution and very slow flow rates when adding the last bit of fuel to avoid splashing it out of the top of the filler neck and dousing yourself. If parking the aircraft overnight after fueling, leave a one inch expansion space.

WARNING

The Pawnee fuel gauge can be difficult to read at times. Giving your fuel status to the FOO during the day so they can help monitor your fuel is a good step. Jostling the aircraft while sitting in the seat will cause the fuel gauge to bob up and down and can help you determine how much fuel remains. If in doubt, have someone visually check the gauge from the side, or refuel.

Before Starting Engine

- Seat –Adjust/Lock
- Seatbelt/Shoulder Harness – Fasten/Adjust
- Master – Re-check Off
- Mags – Re-check Off
- Radio – Re-check Off
- Transponder – Re-check Off
- Circuit Breakers – Check
- Toe Brakes – Apply
- Parking Brakes – Check Released
- Fuel Shut Off Valve –On (Down)
- Trim Tab – Test/Set for Take Off (neutral)
- Flaps – Up
- Altimeter -- Set

Starting Engine

- Carb Heat – Cold
- Mixture – Full Rich
- Throttle – Cracked (approx. ¼ inch)
- Prime – As Req'd, then primer in and locked

NOTES

For first start of the day:

OAT < 75F: Prime 4 – 6 times; OAT > 75F: Prime 2 – 3 times
1 – 2 throttle pumps for subsequent starts when engine is warm

CAUTION

Use caution not to flood the engine. Raw fuel may drain from the carburetor and could cause an engine fire.

- Master Switch – On
- Propeller Area – Clear
- Left Magneto (only) – On
- Starter – Engage

NOTE: Starter Limitations

Crank for 10 sec then 20 sec Cool Off
6 Start Attempt then 30 minute Cool Off

- Propeller – Count four blades
 - If no start, pump throttle 2 – 3 times
- Throttle – Adjust for 1000 – 1200 RPM
- Oil Pressure – Check for rise within 30 sec.
- Right Magneto – On

After Engine Start

- Radio – On
- Transponder – Standby
- Ammeter – Slight Charge (at > 1300 RPM)

Before Taxi

- Flight Controls – Check
- Flight Instruments – Check
- Mags – Re-check Both On
- Radio Advisory Call – As Req'd

Taxi

- Brakes – Test
- Flight Controls – Standard for Wind Conditions
- Area -- Clear
- Taxi Speed – As Required (Use Caution, especially with tail winds)

Run Up

WARNING

Winds can be very unpredictable, particularly when gusty. Position the nose into the wind during run up so a gust won't raise the tail and cause a prop strike.

CAUTION

Engine run ups over gravel can cause propeller damage. Also, Do not perform run ups in the vicinity of other aircraft where prop wash can damage aircraft or vehicles

NOTE

Engine is usually sufficiently warm for run up after 5-6 minutes running when it will idle smoothly. If the engine can accept throttle advancement without “stumbling”, the engine is sufficiently warm

Run Up

- Aircraft – Position as req'd
- Controls – Full Aft Stick
- Brakes – Hold (Do Not Use Parking Brake)
- Flight Instruments – Check
- Throttle – Idle
 - Left Mag – Off / On (Engine Does Not Shutdown)
 - Right Mag – Off / On (Engine Does Not Shutdown)
 - Both Mags – Off Momentarily (Checks Proper Grounding), then Both On
- Throttle – 2000 RPM
- Ammeter – Check (Positive Above 1500 RPM)
- Oil Pressure – Check (60-90 PSI)
- Carb Heat – Check (Note RPM Drop)
- Magnetos (Check Each Off, Then On)
 - No More Than 125 RPM Drop
 - Difference Between Mags Within 50 RPM

Staging

- Be aware of dragging rope, especially with turns and people walking around staging gliders
- Minimize Prop Blast at people and parked gliders
- Minimize engine RPM over gravel areas, particularly during south end operations
- Watch downwind while waiting hook up for gliders with no radio
- Use mirrors to take up slack line, avoid pulling glider ahead and over the rope, watch wing runner signals.
- Check that glider canopy and airbrakes are closed and all personnel are clear before rudder waggle response

Before Takeoff

CAUTION

Accomplish a before takeoff check before each takeoff to ensure proper configuration of the aircraft. Improper configuration can lead to poor aircraft performance or physical damage.

- Seatbelt and shoulder harness – Fastened
- Flaps – Up
- Trim – Set for Take Off (near neutral)
- Carb Heat – Cold
- Mixture – Rich
- Mags – Both On
- Fuel – Check quantity
- Master – On
- Radio – On with 122.90 selected
- Transponder – Alt selected and squawk 1200
- Oil Pressure – Check
- RPM – Response with Power Application
- Parking Brakes – Released
- Windows – Closed and verified locked

Takeoff

- Gentle smooth power application
 - Approx. 3 second throttle advance for most gliders that rest on the nose (too quick bangs the tail down)
 - Gliders that use a nose release or rest with the tail down will want faster throttle application to get aileron control quicker.
- Tail-up takeoff approx. 5 kt prior to desired tow speed, accelerate in ground effect and transition to climb

NOTE

Standard Tow Speeds

SGS 2-33.....	55 Kts (Can Handle 50-65)
SGS 1-26.....	55 Kts (Can Handle 50-65)
Grob 103.....	60-65 Kts
LS-4 (& Other Glass Ships).....	60-70 Kts
With Water Ballast..... \geq 70 Kts

- Be ready to release tow
 - Danger of loss of elevator control if glider “kites” or fails to climb
 - Danger of loss of rudder control if glider does not maintain lateral position
 - Pawnee engine problem

Climb

- Speed – Do not chase ASI. Fly pitch, use ASI as “reference”. Thermal activity will cause ASI changes.
- Never reduce power from full throttle with glider on tow, unless it is intentional level off to keep from over speeding glider V_t
- Gentle turn entry / rollout
 - Approx. 15-20 degree banked turns
 - Experienced glider pilots may turn in thermal climbs with increased bank angle. This is not for students – know your glider pilot limits.
- Mixture – Periodically lean to best power at 5000' density altitude or 1000' AGL (whichever is higher). Too rich a mixture will foul plugs.

Cruise

NOTE

During the check flight at the beginning of the day, establish a 2300 RPM cruise near 4000 ft, lean the mixture to a cruise setting (approx ¼" rich of engine roughness or RPM drop), and note the mixture position. This is a good position for descents.

- Speed – As req'd
 - 2400 RPM max.
 - Adjust to no more than glider Vt minus 5 KIAS (allows for speed increases caused by thermals).
- Mixture – Set For Cruise (lean until RPM drop or engine roughness, then ¼" toward rich position).
- Fuel Level – Monitor (Plan on 15 gph burn rate)
- Carb Heat – As Req'd (Primary carb ice indication is sneaky gradual RPM drop)
- Ride – Enjoy (Highest speed will be about 90 KTAS, regardless of cruise altitude).

Descent

- CLEAR TRAFFIC, Turn Left After Tow Release
- Throttle – Smooth Reduction to 2200-2300 RPM
- Flaps – As Desired (watch 95 KIAS limit!)
- Mixture – Set (use cruise position established earlier)

Letdown Techniques

- Keep the power up and make power reductions gradual.
- We have been using two techniques that avoid shock cooling
 - No flaps, higher speed (90 – 100 KIAS) with 2300 RPM minimum until level-off and pattern entry – gives about 1000 FPM descent.
 - Full flap during turn after tow release, hold 80 KIAS and 2200 – 2300 RPM, spiral descent with 2 – 2.5 Gs (stall warning light blinks) and approx 60 degree bank – gives about 2000 FPM descent.
- Attempt to control descent and ground track to enter the pattern at the proper location, altitude and airspeed with the power about 2000 RPM.

Before Landing

- Flaps – As Req'd (No Flaps When Landing On Gravel)
- Trim – As Req'd
- Carb Heat – As Req'd
- Mixture – Rich
- Fuel Quantity – Check (level flight, cruise attitude)
- Oil Pressure—Check

Techniques

- Use continued descent on downwind, to attempt to reach approx 500ft AGL at the base turn
- Plan for a slightly steep final. Remember you have 200 ft. of rope dangling behind you that can hit cars, fences and people. We have lost more than one weak link in the perimeter fences.
 - Maintain at least 500 ft if you fly over people or aircraft.

Landing

- Throttle – Shoot for 1300-1500 RPM to hit your spot
 - If you wind up using 1700 RPM or more, your final approach is too flat (remember the rope?)
- Flaps – As Desired (recommend no flap in strong X-winds)
- Approach speeds (short final)
 - 60-65 KIAS no flap
 - 55-60 KIAS full flap
- Trim – As Req'd
- Throttle – idle or as req'd to hit your spot
 - Avoid landing in the dirt overruns unless necessary due to strong X-winds – we have punched holes in the flaps doing that when conditions are normal.

WARNING

Use caution when applying heavy braking after landing. The long moment-arm forward of the landing gear can cause the aircraft to rotate forward about the wheels even when full aft stick is applied. Apply full back stick and ease off braking pressure if the tail starts to lift.

Landing

Techniques

- The Pawnee will not float very far if you have nailed your final approach speed. Power-off stall speed is about 40 KIAS, so there is a lot of margin available to flare and touch down.
 - Make wheel landings in strong X-winds
 - Try to avoid landing tail-wheel first
- Use wing-low slip on final for X-wind correction.
- Slips cause noticeable drag
 - Full-rudder slips with the power in idle will bring the Pawnee down like a ton of bricks, especially with a headwind component. BE ALERT, and resume a normal final approach in time.
 - If you wind up doing a full-rudder slip, consider going around to set up a better final approach.

Engine Shutdown

NOTE

After the last flight of the day, perform a normal engine runup and mag. check to verify proper operation for the next day's tow operations.

- Flaps – Up
- Carb Heat – Cold
- Radio – Off
- Transponder – Off
- Engine – 1000 – 1200 RPM for 30 secs.
- Mixture – Idle Cutoff
- Propeller – Stopped
- Mags – Both Off
- Master – Off

CAUTION

Never leave aircraft unattended without tie downs, especially with summer thermals or winter winds. Use discretion on calm days and at least lock the brakes. Always make sure the tow line is clear of the runway

Refueling

- Fuel Card, static line, ladder (personal preference)
- Fill Up Option , N number
- Wait for verification/authorization and pump to start
- Green Button to reset counter (see NOTES about fuel on page 7)
- Get Fuel Slip after stowing hose, record all fuel and oil added on tow pilot log with Tach reading
 - If you used the ladder, leave it on its side to prevent the wind from blowing it into parked aircraft.

Post-Flight and Tie-Down

- Flaps – Full Down (unless flap locks are available)
- Carb Heat – Cold
- Mixture – Idle Cutoff
- Mags – Off
- Radio – Off
- Transponder – Off
- Master – Off
- Nav Lights – Off
- Parking Brakes – Off
- Fuel Shutoff Valve – On
- Tach Time – Note
- Squawks – Note on tow pilot log
 - Make sure a Board Member/Mx Officer knows of a mx issue the day it occurs.
 - Critical for a Saturday discovery and Sunday flying
- Tow Pilot Log – Remove
- Headset & Kneeboard – Remove
- Trim – Full Aft
- Control Stick – Secured full aft w/seat belt
- Windows – Closed
- Chocks – Install
- Pitot Cover – Install
- Tie Downs – Install and Lock

Towing Operations

Danger Areas

- Crosswind to downwind turns with other traffic entering on the downwind
- Pick up landing traffic early, adjust pattern accordingly, maybe turn behind landing traffic
- If you can't see who has called the downwind, consider:
 - Straight out, glider on tow into a wind will have a steeper climb gradient than glider not on tow returning with a tail wind if rope breaks.
 - Continue Cross wind, be aware of glider glide distance needed to runway and winds
 - Turn inside the downwind and fly inside the rail road track, towards runway, giving the downwind to unseen traffic
- Towing along ridge line with ridge lift and other gliders present, watch turns off release and escape route. It may be best to continue straight ahead and climb after release to clear traffic.

Towing Operations

Emergencies (Hopefully, for practice)

- Glider departs the runway – Actuate Tow Release
- Low Altitude Rope Break:
 - Over the Runway: Tow continues takeoff, glider may land straight ahead in remaining runway
 - 200 ft – 500 ft AGL: Tow clears area toward standard pattern.
 - Watch for the direction of glider turn and turn to keep the glider in sight. You may see its shadow on the ground before you can see the glider.
 - Consider wind speed/direction. Your options are to turn and land opposite direction behind glider or make a full pattern.
 - Make sure glider is far enough down the runway and not stopping short to allow you landing distance.
 - Above 500ft AGL, expect glider to do abbreviated pattern
 - Remain clear of the glider
 - Enter pattern behind glider unless otherwise briefed by CFIG

Towing Operations

Normal Training Practices

- Boxing the Wake
 - Plan your maneuvering during the initial climb to establish prolonged straight flight into the wind when you reach 1500 ft AGL.
 - Establish heading by using a distant horizon reference point you can see over the nose.
 - Establish your attitude reference for speed.
 - Anticipate speed increases/decreases of about 5 KIAS as glider descends and climbs.
 - Noticeable forward stick will be required for transitions to the low tow position
 - Noticeable back stick will be required during transitions to the high tow position
 - Anticipate rudder pressure changes as the glider transitions from side to side – nail your heading reference
 - Maintain straight flight until the glider is stabilized at the end of maneuver before turning
 - Keep your head on a swivel and make sure the area you are flying into is clear. The glider pilot and instructor will be focused solely on you.

Towing Operations

- Slack Line
 - Be prepared for a momentary tail pull and airspeed decrease as glider climbs and maneuvers to one side
 - Airspeed may increase with slack line, just maintain pitch attitude and heading
 - Anticipate Pitch/Yaw reaction to taut line, maintain heading and airspeed

- Pattern Tow
 - About 500ft AGL before crosswind turn works best (south departure)
 - Extend upwind leg to near abeam prison for north departure: Use 20 – 30 degree bank to avoid prison overflight.
 - Apx 700-800 AGL nearing railroad tracks (south departure).
 - Plan flight path to reach 1000ft AGL in the desired release area.
 - For strong winds at altitude, adjust turn points to allow for rapid downwind ground speed with little climb gradient to reach desired altitude/release location

Towing Operations

- North (Runway 02R) operations
 - Be alert for lee side downflow from ridge behind prison
 - Strong north wind may allow altitude for turn inside of prison
 - In no or “light” rotor, may turn between prison and ridge line/water tank area, depends on the day, not recommended
 - With good climb gradient into winds, use ridge lift to help maximize climb rate.
 - Always keep safe return altitude for glider on the north side of the ridge.

Limitations

- A. No acrobatic maneuvers, including spins, are approved.
- B. Operations with the windows open in flight are prohibited.
- C. The stall warning system is inoperative with the master switch off.
- D. Airspeed Limitations:

Never Exceed Speed (Vne).....	135 knots
Maximum Structural Cruise Speed (Vno).....	108 knots
Maneuvering Speed (Va).....	104 knots
Maximum Flaps Extended Speed (Vfe).....	95 knots

E. Engine Limitations

Configuration	RPM	Oil Pressure (psi)	Oil temp (°F)
Within 30sec of engine start	--	Visible Rise	--
Warmup	1200	Min 25	--
Magneto Check Max Drop 125 Max Diff 50	2000	60-90	Min 40
Normal Operation	2575 (Max)	60-90	120-245

F. Fuel Limitations / Recommendations

Typeminimum 80/87, Recommended 100LL
NOTE: Pawnee has STC for auto gas
 Recommended Minimum Fuel for Takeoff7 gal.

G. Oil Limitations / Recommendations

TypeAeroShell W100 (50 wt)
 Minimum For Flight.....9 qt
 Minimum in Hot Weather.....10 qt
 Recommended Maximum Fill Level11 qt
 Maximum.....12 qt

H. Starter Duty Cycle Limitations

- 1) Do not crank the starter for more than 10 seconds.
- 2) If the engine fails to start, wait 20 seconds for cooling before each subsequent start attempt.
- 3) After 6 start attempts, wait 30 minutes for cooling before making another start attempt.

Tow Release Diagram

