

Bermuda Dunes Flight Training

Cessna 172S Transition & Training Manual (1998-2009 Steam & G1000 Editions)



"If you aren't having fun, you're doing it wrong."

HOW TO USE THIS MANUAL

Welcome to Bermuda Dunes Flight Training. This manual is your roadmap to mastering the 1998-2009 Cessna 172S Skyhawk SP. We operate both traditional steam gauge and G1000-equipped aircraft, and this guide bridges the gap between raw stick-and-rudder flying and modern glass panel management. Like everything we do here, this is built on honesty, candor, and a relentless focus on making you a safe, competent pilot.

- **Prerequisite:** A smile.
- **The Mission:** To develop rock-solid fundamentals. Whether you are scanning analog gauges or a massive digital display, the airplane flies exactly the same way.
- **The Authority:** This manual is a companion to the Pilot's Operating Handbook (POH). The POH and the Pilot-in-Command (PIC) always remain the final authorities.

SECTION 1: GENERAL AIRCRAFT SYSTEMS & LIMITATIONS

We don't guess in the cockpit. The 172S is heavier and more powerful than older Skyhawks, equipped with a fuel-injected 180 HP engine. You must know its physical and mechanical limits.

Powerplant & Propeller The throttle controls manifold pressure, while the fixed-pitch propeller RPM adjusts dynamically based on airspeed and power setting.

System	Specification
Engine Manufacturer	Lycoming
Engine Model	IO-360-L2A
Engine Type	4-cylinder, horizontally opposed, direct drive
Cooling & Fuel	Air-cooled, fuel-injected
Horsepower	180 HP @ 2700 RPM
Max Engine RPM	2700 RPM
Oil Temp Limit	245°F (118°C) maximum
Oil Pressure Limits	20 PSI minimum, 115 PSI maximum
Propeller Type	McCauley Fixed Pitch (2 blade, 76-inch)

Weights, Fuel & Fluids Energy management starts with weight and balance. The 172S can carry a lot, but it cannot carry full fuel, four adults, and baggage simultaneously.

Category	Limit / Capacity
Max Takeoff Weight	2550 lb
Max Landing Weight	2550 lb
Standard Empty Weight	~1660 lb (Varies slightly between Steam/G1000)
Max Useful Load	~890 lb
Max Baggage Weight	120 lb
Total Fuel Capacity	56.0 U.S. gal
Usable Fuel	53.0 U.S. gal (26.5 gal per wing tank)
Fuel Grade	100LL Blue

Oil Capacity

8 U.S. qts (Minimum 5 qts for flight)

Airspeed Limitations (V-Speeds) These numbers are not suggestions; they are structural and aerodynamic boundaries. All speeds are in Knots Indicated Airspeed (KIAS).

Speed	KIAS	Definition
Vs0	40	Stall speed in landing configuration (Flaps 30°)
Vs1	48	Stall speed in clean configuration (Flaps 0°)
Vr	55	Rotation speed
Vx	62	Best angle of climb
Vy	74	Best rate of climb
Vgld	68	Best glide speed (at 2550 lbs)
Vfe (10°)	110	Maximum flap extended speed (Flaps 10°)
Vfe (20°-30°)	85	Maximum flap extended speed (Flaps 20°-30°)
Va (2550 lbs)	105	Maneuvering speed (at max gross weight)
Va (1900 lbs)	90	Maneuvering speed (at light weight)
Vno	129	Maximum structural cruising speed
Vne	163	Never exceed speed

Panel & System Variations (Steam vs. G1000)

- **The Steam Gauge (NAV I/II):** Relies on an engine-driven vacuum pump to spin the attitude and heading indicators. The vacuum gauge must read between 4.5 and 5.5 in. Hg.
- **The G1000 (NAV III):** Eliminates the vacuum pump. Primary flight data is processed by the Air Data Computer (ADC) and Attitude and Heading Reference System (AHRS). It features a standby battery to power the essential bus if the main alternator and battery fail.

- **Flaps:** Electrically driven, single-slotted flaps. Positions are 0°, 10°, 20°, and 30°.
- **Trim:** Manual, cable-driven elevator trim wheel on the center pedestal.

SECTION 2: THE ENVELOPE OF SAFETY (RISK ASSESSMENT)

We don't fly into the "unknown." We set hard limits based on your experience.

Initial Operating Experience (IOE) Your first 50 hours in the 172S are your critical "learning phase," particularly when adapting to the G1000's information density or the fuel-injected engine's hot-start characteristics.

- **Focus:** Perfecting pitch-and-power flying without fixating on the digital screens (for G1000) or chasing needles (for steam).

Personal Weather Minimums Identify which category you fall into based on your total time:

- **Category A (Low Risk):** >500 Total Time.
- **Category B (Medium Risk):** Typical Private Pilot.
- **Category C (High Risk):** Student pilots or low-time VFR pilots.

Criteria	Category A	Category B	Category C
Day VFR Ceiling	2,000 ft	3,000 ft	4,000 ft
Day VFR Visibility	3 miles	5 miles	8 miles
Max Crosswind	15 kts (Max Demo)	10 kts	5 kts
Runway Surface	Any Approved	Any Approved	Hard Only

SECTION 3: DEVELOPING PROFICIENCY

Stick and Rudder vs. Buttons: In the steam gauge aircraft, your challenge is maintaining a disciplined instrument scan. In the G1000, your challenge is avoiding automation dependency.

- **The Challenge (Steam):** Keep your eyes outside 80% of the time. Don't let analog needles drag your attention inside the cockpit.
- **The Challenge (G1000):** If the screens go dark or the autopilot fails, it is still just a Cessna 172. Hand-fly the airplane whenever safe.
- **The Mindset:** I consider myself to be always still learning. That same humility and dedication to continuous improvement is required in the left seat, regardless of how many hours you have.
- **The Skill:** Proficiency is "use it or lose it."

SECTION 4: STANDARD OPERATING PROCEDURES (SOPs)

We fly by the numbers. Every time. SOPs are the baseline for a safe flight. At Bermuda Dunes Flight Training, we believe in radical consistency. The exact same flow that keeps you safe on a clear day VFR hop is what will save your life during a high-workload IFR diversion.

Checklist Philosophy

- **Do-List:** Read an item, then perform the action (Pre-flight, Engine Start, Run-Up, Emergencies, Shutdown).
- **Flow Pattern:** Perform the actions in a logical spatial path through the cockpit, then verify with the written checklist (Takeoff, Climb, Cruise, Descent).

Part 1: The Phase-by-Phase Flow

1. Engine Start & Avionics Setup (Do-List)

- **The Engine (Fuel Injected):** Mixture Rich, Fuel Pump ON for 3-5 seconds to prime, Fuel Pump OFF, Mixture to Idle Cut-Off. Crank. As the engine fires, smoothly advance the mixture to Rich. Watch oil pressure. (Beware the hot start: Do not over-prime).
- **Avionics (Steam):** Master ON. Avionics Master ON. Initialize GPS/Radios.
- **Avionics (G1000):** Master (BAT) ON. Verify PFD boots. Master (ALT) ON. Avionics Master (BUS 1 & 2) ON. Verify MFD boots. Enter flight plan.

2. Taxi (Flow, then Verify)

- **The Flow:** Brakes tested immediately. Flight instruments checked during turns.
- **Systems Check:** Verify vacuum suction (Steam) or lack of red X flags (G1000).

3. Run-Up (Do-List)

- **The Flow:** 1800 RPM. Magneto drop (max 150 drop, 50 diff). Verify vacuum suction in the green (Steam) or electrical bus volts/amps (G1000). Engine instruments in the green.

4. Before Takeoff (Flow, then Verify)

- **The Flow:** GUMPS check. Gas on BOTH. Undercarriage (fixed). Mixture set for density altitude. Propeller (fixed). Switches (Pitot heat as required), Seatbelts.
- **Lights, Camera, Action!** (Lights, Xpdr, Mixture).

5. Climb & Cruise (Flow, then Verify)

- **The Climb:** Rotate at 55 KIAS. Pitch for 74 KIAS (Vy) to clear obstacles, then transition to 80-85 KIAS for an en-route climb to improve forward visibility and engine cooling.
- **Cruise:** Level off, let the aircraft accelerate (110-115 KTAS), reduce RPM to 2300-2500. Lean the mixture (approx 50° rich of peak EGT, or via G1000 lean assist).

6. Descent & Before Landing (Flow, then Verify)

- **The Flow:** ATIS acquired. Altimeter set. Brief the approach. Gas on BOTH. Mixture rich (or set for field elevation).

7. Shutdown & Securing (Do-List)

- **The Flow:** Avionics Master(s) OFF. Mixture idle cut-off. Mags OFF. Master OFF.

Part 2: Maneuver-by-Maneuver Guide The 172S is forgiving but requires heavy rudder input during high-power/low-airspeed maneuvers due to the 180 HP engine.

1. Steep Turns

- **Entry:** 95 KIAS.
- **Execution:** Roll smoothly into a 45° bank.
- **The Catch:** Add a bump of power (~100 RPM). Look outside at the cowling's relationship to the horizon. Some say add trim but I personally like the feel of not adding trim. It helps make it easier to level and transition.
- **Recovery:** Roll out exactly on heading, reduce power, and relieve back pressure.

2. Slow Flight (Dirty Configuration)

- **Entry:** Power back to 1500 RPM. Below 110 KIAS, Flaps 10°. Below 85 KIAS, Flaps Full (30°).
- **Execution:** Maintain altitude while slowing to 55-60 KIAS.
- **The Catch:** Pitch for airspeed, power for altitude. Right rudder is required to counteract the P-factor.

3. Power-Off Stalls (Approach to Landing Simulation)

- **Entry:** Establish a stabilized descent at 65 KIAS with Flaps 30° and power at 1500 RPM.
- **Execution:** Slowly retard the throttle to idle and pitch up to maintain altitude.
- **Recovery:** At the break, lower the nose slightly to reduce Angle of Attack (AOA), add FULL power, level the wings with rudder. Retract flaps to 20° immediately. Once a positive rate of climb is established, retract flaps to 10° then 0°.

4. Power-On Stalls (Takeoff Simulation)

- **Entry:** Slow to 60 KIAS (Flaps 0°).
- **Execution:** Add full power and aggressively pitch up (approx. 15-20° nose up). Step heavily on the right rudder.
- **Recovery:** Relax back pressure to reduce AOA. Level wings with rudder. Pitch for V_y (74 KIAS).

5. Short Field Takeoff

- **Entry:** Flaps 10°. Use all available runway.
- **Execution:** Hold the brakes firmly. Apply FULL throttle and verify engine gauges are in the green. Release the brakes. Keep the elevator neutral until rotation.
- **The Catch:** Rotate briskly at 51 KIAS and aggressively pitch to climb at 56 KIAS until obstacles are cleared. Once clear, pitch down for V_y (74 KIAS) and retract flaps.

6. Short Field Landing

- **Entry:** Flaps 30°. Fly a slightly steeper, stabilized approach.
- **Execution:** Maintain exactly 61 KIAS on final. Power to idle smoothly as you clear the simulated 50-foot obstacle.
- **The Catch:** Touch down firmly on the main wheels. The second the mains touch, smoothly apply maximum braking and retract the flaps to 0° to dump lift and put the full weight of the aircraft on the tires.

7. Soft Field Takeoff

- **Entry:** Flaps 10°. Keep the aircraft rolling as you enter the runway; do not touch the brakes.
- **Execution:** Hold the yoke FULL AFT. Smoothly apply full power. As the nose lifts, ease off the back pressure slightly to prevent a tail strike, but keep that nosewheel off the ground.
- **The Catch:** The aircraft will lift off prematurely into ground effect. You must immediately level off inches above the runway to let the airplane accelerate in ground effect to 62 KIAS (V_x) or 74 KIAS (V_y) before climbing out. Retract flaps once safely climbing.

8. Soft Field Landing

- **Entry:** Flaps 30°. Approach at 65 KIAS.
- **Execution:** Keep a small amount of power in during the flare (approx. 1100-1200 RPM) to arrest the sink rate and grease it onto the main wheels.
- **The Catch:** Hold the yoke FULL AFT throughout the entire rollout. Do not touch the brakes. Your goal is to keep the nosewheel off the soft surface for as long as aerodynamically possible.

9. Emergency Descent

- **Entry:** Throttle to IDLE.
- **Execution:** Immediately roll into a 30° to 45° bank and pitch down to accelerate to 129 KIAS (V_{no}).
- **The Catch:** Do not simply push the nose forward into a 0G pushover. A 0G push will cause dirt and debris to float into your eyes and can disrupt fuel flow. Rolling into a bank maintains a positive G-load, keeps your fuel feeding smoothly, and allows you to look down and clear the airspace immediately below you. Level the wings once your descent rate is established and maintain positive Gs through the entire maneuver.

APPENDIX A: THE P.A.V.E. CHECKLIST

Use this before every flight. If you have "Marginal" items in two or more categories, do not fly.

- **P - Pilot:** Sleep, Stress, Medication. Are you physically and mentally prepared?
- **A - Aircraft:** Vacuum pump healthy? (Steam). ADC/AHRS free of flags? (G1000). Is fuel adequate?
- **V - Environment:** Is the weather meeting your Category minimums? A smart PIC knows when to put it down early to avoid punishing thermal turbulence.
- **E - External Pressures:** Are you in a rush? Is "get-there-itis" creeping in?

BRIAN'S APPENDIX: ADVANCED MANEUVERS & AIRSPEEDS

Airspeeds & Ground Reference Maneuvers

- **Private Pilot Ground Reference:** 90-100 KIAS
- **Eights on Pylons:** ~100 KIAS (depending on pivotal altitude)
- **At-Altitude Maneuvers:** 95 KIAS

Traffic Pattern Operations

- **Downwind Leg:** 2100 RPM to maintain 90 KIAS; Flaps 10° abeam the numbers.
- **Base Leg:** Reduce power to ~1500 RPM; Flaps 20°; pitch for 80 KIAS.
- **Final Approach:** Flaps 30°; maintain 65-70 KIAS. Modulate power to maintain glidepath.

Final Approach Speeds

- **Full Flaps (30°):** 65 KIAS (Short field: 61 KIAS)
- **20° Flaps:** 70 KIAS
- **0° Flaps:** 75-80 KIAS

Specialized Landing Techniques

- **0-Flap Landings:** The 172 loves to float without flaps. Reduce power early and be patient. Do not force the nose down, or you will bounce. Keep flying it inches off the runway until the main wheels chirp.
- **Power-Off 180s:** Trim aggressively. Drop flaps to 10° immediately upon pulling power to tighten your turning radius and hold for 80 kts. Now, use your aim point just like turns-around-a-point for the first 90 degrees but save the rest of your flaps until you have the runway definitively made. You can use the flaps for the balloon effect if you are low. You can raise your flaps to hit your target. Keep in mind, a 172 with 30° of flaps and an idle engine will come down like an elevator.