C172 Training Supplement

GT-AVIATION

AIRCRAFT SYSTEMS | **MANEUVER GUIDE** | **ORAL REVIEW**

REV 2 - APR 2021

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GT AVIATION
CHAPTER 1
Aircraft Systems

AIRCRAFT SYSTEMS

Engine
The Cessna 172P model is equipped with a Lycoming, 4 cylinder, normally aspirated, carbureted, 320 cubic inch, horizontally opposed, air cooled, direct drive, O-320-D2J engine. The 172-P model produces 160 HP @ 2700RPM. Ignition is provided by 2 independently powered magnetos on the back of the engine which provide spark to 8 spark plugs (2 per cylinder). The engine has a 7-quart oil sump. GT Aviation minimum oil quantity for takeoff is 5 quarts. (Pilots Operating Handbook "POH" 7-16)

Propeller
The engine drives an aluminum alloy, two-bladed, fixed pitch, 75-inch propeller. (POH 7-20)

Vacuum System
One engine-driven vacuum pump is located on the back of the engine, providing vacuum to the attitude and heading gyros, and has a normal operating range of 4.5-5.4 inches of mercury. A suction reading out of this range may indicate a system malfunction, and in this case, the attitude and heading instruments should not be considered reliable. (POH 7-34)

Landing Gear
The landing gear is a fixed, tricycle type gear consisting of a tubular spring steel providing shock absorption for the main wheels and an oleo (air/oil) strut providing shock absorption

on the nose wheel. The nose strut extends in flight, locking it in place. The nose wheel contains a shimmy damper which damps nose wheel vibrations during ground operations at high speeds. The nose wheel is linked to the rudder pedals by a spring loaded steering bungee which turns the nose wheel up to 10 degrees each side of center. Differential braking allows for up to 30 degrees of steering either side of center. (POH 7-10)

Brakes

Each main gear wheel is equipped with a hydraulically actuated single-disc break on the inboard side of each wheel controlled by master cylinders attached to both pilots' rudder pedals. When the airplane is parked, the main wheel brakes may be set by the parking brake handle beneath the left side instrument panel. To apply the parking brake, set the brakes with the rudder pedals, pull the handle aft and rotate it 90 down. (POH 7-23)

Flaps

The 172 has single slot type flaps driven electrically by a motor in the right wing. A flap position selector on the instrument panel has detents at the 0, 10, 20, and 30 position. (POH 7-10)

Pitot/Static

The pitot static-system consists of a pitot tube on the left wing providing ram air pressure to the airspeed indicator, and a static port on the left side of the fuselage providing static pressure to the Altimeter, Vertical Speed Indicator and Airspeed Indicator. The pitot tube is electrically heated and

an alternate static source is located under the instrument panel. (POH 7-30)

Fuel System
The C172P is equipped with two tanks, one on each wing, with a total fuel capacity of 43 gallons, 40 of which is usable. There are two fuel sumps, one on each wing, and one fuel strainer under the engine cowling. There are 3 fuel vents – 1 under left wing behind the strut, and 1 in each fuel cap.

Fuel flows by gravity from the two wing tanks to a four-position selector valve, labeled BOTH, RIGHT, LEFT, and OFF. With the selector valve in either the BOTH, LEFT, or RIGHT, position, fuel flows through a strainer (filter) to the carburetor. From the carburetor, mixed fuel and air flows to the cylinders through intake manifold tubes. The manual primer draws its fuel from the fuel strainer and injects it into the cylinder intake ports. (POH 7-20)

Note: the fuel selector valve must be in the BOTH position for takeoff, climb, landings, and maneuvers that involve prolonged slips or skids. Operation from either LEFT or RIGHT tank is reserved for cruising flight.

Carburetor
The engine is equipped with a float-type carburetor mounted on the bottom of the engine. Fuel is delivered to the carburetor by gravity flow from the fuel system. In the carburetor, fuel is atomized, proportionally mixed with intake air, and delivered to the cylinder through intake manifold

tubes. The proportion of atomized fuel to air may be controlled by the mixture control. (POH 7-19)

Air Induction System

The engine air induction system receives ram air through an intake in the lower front portion of the engine cowling. The intake is covered by an air filter which removes dust and other foreign matter from the induction air. Airflow passing through filter continues into the airbox and then into the carburetor where it is mixed with fuel and is then ducted to the engine cylinders through intake manifold tubes. In the event carburetor ice is encountered or the intake filter becomes blocked, alternate heated air can be obtained from a shroud around an exhaust riser which is operated by the carburetor heat control on the instrument panel. This air is unfiltered and at full power with carburetor heat on, approximately a 75-150 RPM loss will occur. (POH 7-19)

Carburetor Heat

Under certain moist atmospheric conditions at temperatures of 20F to 70F (-5 to +20C), it is possible for ice to from in the induction system, even in summer weather. Carburetor ice occurs due to the effect of fuel vaporization and the decrease in air pressure in the venturi, which causes a sharp temperature drop in the carburetor. If water vapor in the air condenses when the carburetor temperature is at or below freezing, ice may form on internal surfaces of the carburetor, including the throttle valve. To avoid this, the carburetor heat is provided to replace the heat lost by vaporization. The

initial signs of carburetor ice can include engine roughness and a drop in engine RPM.

Note: Operated by the knob next to the throttle control, Carburetor heat should be used in flight whenever the RPM gauge reads below the green arc, or when carburetor icing is suspected. (PHAK 7-9)

Electrical System
The airplane is equipped with a 28-volt system. The system is powered by a belt-driven, 60-amp alternator located at the front of the engine, and a 24-volt battery. Power is supplied through electrical buses and circuit breakers. Circuit breakers should be reset in flight only once, and only if there is no smoke or "burning smell", and only if the affected system and equipment is needed for the operational environment. (POH 7-24)

Exterior Lighting
Exterior lighting consists of navigation lights on the wing tips and on top of the rudder, a dual landing (inboard) / taxi (outboard) light configuration located on the left wing leading edge (or sometimes in the cowl nose cap), a flashing beacon mounted on the top of the vertical fin, and a strobe light in each wing tip (in most GT 172 aircraft). (POH 7-28)

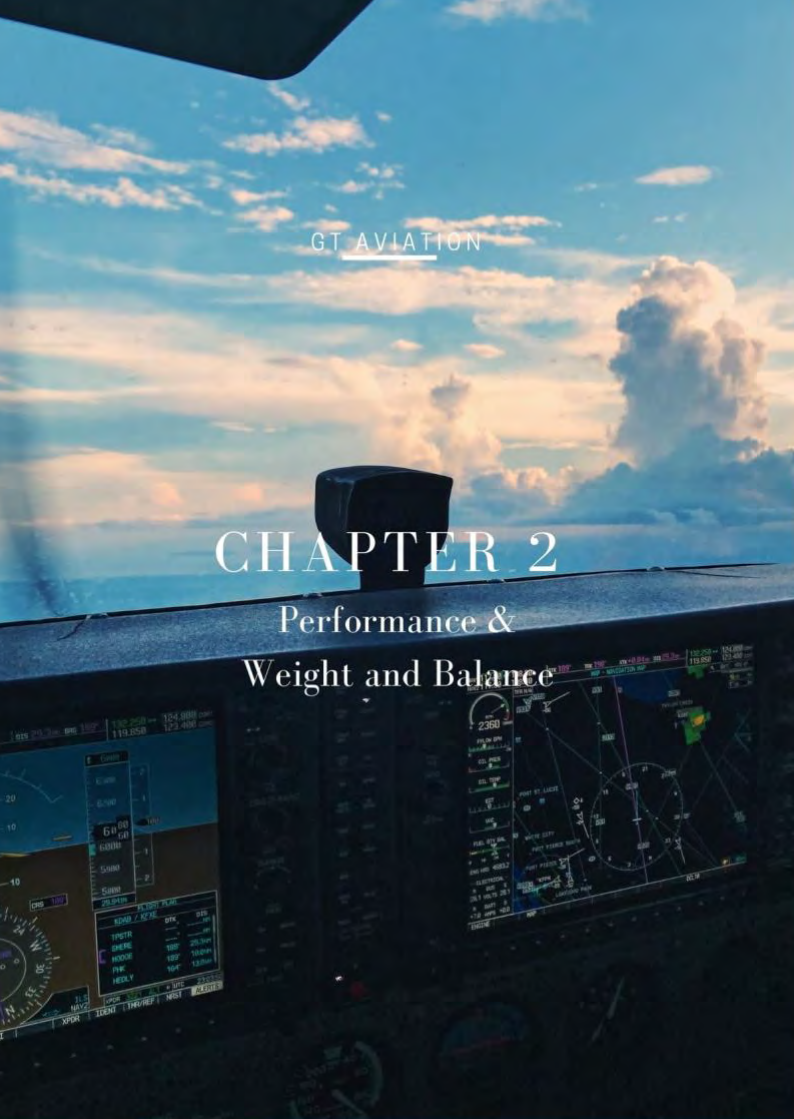
Note: ADSB-Out is paired with NAV lights in GT Aviation Aircraft. GT Aircraft must have NAV lights on in areas where ABSB-Out is required (see FAR 91.225).

Environmental
Cabin heat is provided by air ducted through the exhaust shroud and into the cabin and is controlled by a knob on the instrument panel. Air flow is controlled by a Cabin Air knob on the instrument panel and additionally by vents near the top corners of both left and right windshields. (POH 7-30)

Stall Warning System
A pneumatic type stall warning system consists of an inlet on the left wing leading edge, which is ducted to a horn near the top left of the windshield. As the aircraft approaches a stall, the lowered pressure on top of the wing shifts forward drawing air through horn resulting in an audible warning at 5 to 10 knots above the stall. (POH 7-35)

C172P V-Speeds (KIAS):

V_{SO}	33
V_S	44
V_R	55
V_X	60
V_Y	76
V_G	65
V_{FE}	110 (0-10 Degrees) / 85 (10-30 degrees)
V_{NO}	127
V_{NE}	158
V_A	99 @ 2,400 lbs 99 @ 2,000 lbs 82 @ 1,600 lbs



CHAPTER 2

Performance &
Weight and Balance

PERFORMANCE / WEIGHT & BALANCE

Sample Weight & Balance Problem
Complete the following sample weight and balance problem for C-172-P Model

Conditions:

Basic Empty Weight.....**1527.8 lbs.**
Basic Empty Moment.....**58851 lbs.**
(Remember to use actual aircraft BEW for flight check)
Front Pilots.....**350 lbs.**
Real Passengers.....**50 lbs.**
Baggage.....**2 bags at 45 lbs.**
Max Ramp Weight.....**2407lbs.**
Max Takeoff/Landing Weight.....**2400 lbs.**
Max Baggage Weight.....**120 lbs.**
Max Usable Fuel.....**40 gal.**
Fuel Burn = See POH

Calculate the Following:

1. Zero Fuel Weight
2. Zero Fuel CG
3. Takeoff Weight
4. Takeoff CG
5. Landing Weight
6. Landing Weight CG
7. From comparing the takeoff CG and Zero Fuel CG, which direction does the CG move as fuel is burned off?
8. Plot Takeoff and Landing CG on the CG Envelope Graph below.
9. What is the entire distance in inches from max forward CG to max aft CG?

Formulas:

- Weight ***x*** Arm = Moment
- Total Moment / Total Weight = CG
- Fuel Gallons ***x*** 6 = Fuel Weight

Note: Unusable fuel and oil at full capacity are included in the aircrafts Basic Empty Weight.

	WEIGHT	X ARM	= MOMENT
Basic Empty Weight			
Front Pilots +		37	
Rear Passengers +		73	
Baggage 120 lbs. Max +		95	
Zero Fuel Weight =		CG=	
Usable Fuel +		48	
Ramp Weight =			
Taxi Fuel -		48	
Takeoff Weight =		CG=	
Fuel Burn -		48	
Landing Weight =		CG=	

CG Envelope Graph

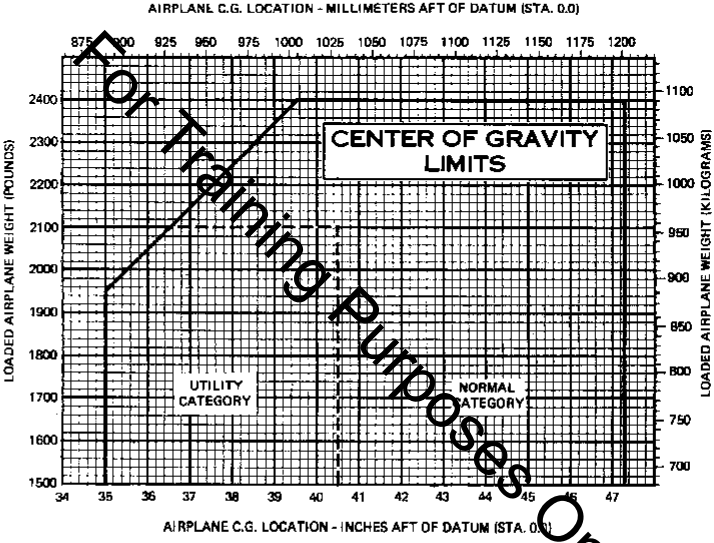


Figure 6-8. Center of Gravity Limits

Calculate the Following:

1. Takeoff Distance: _____
2. Takeoff Distance over 50' Obstacle: _____
3. Landing Distance: _____
4. Landing Distance over 50' Obstacle: _____

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CHAPTER 3

Departure Procedures

DEPARTURE PROCEDURES

Normal Takeoff (Flaps 0)

When Ready:

1. Taxi to Hold Short Line, clear for traffic and other obstacles, and line up on the runway centerline.
2. Increase throttle to full power
3. Check engine gauges (oil pressure, oil temperature) and announce “Engine Instruments Green”
4. Note increase in airspeed indicator and announce “Airspeed Alive”
5. Start slow rotation at 55 KIAS
6. Accelerate to 76 KIAS (Vy)
7. “After Takeoff Checklist” out of 1,000’ AGL

Short-Field Takeoff (Flaps 10)

When Ready:

1. Taxi to Hold Short Line, clear for traffic and other obstacles, and line up on the runway centerline using all available runway
2. Hold brakes
3. Apply Full Power
4. Verify engine has achieved maximum power (Appx 2300RPM) and announce “Power Set”
5. Check engine gauges (oil pressure, oil temperature) and announce “Engine Instruments Green”
6. Release brakes
7. Slowly rotate at 55 KIAS
8. Climb at 60 KIAS

9. When clear over obstacle, accelerate to 76 KIAS (Vy)
10. Flaps 0
11. “After Takeoff Checklist” out of 1,000’ AGL

Soft-Field Takeoff (Flaps 10)

1. Roll onto runway with full aft yoke – minimum braking – do not stop (clear for traffic before entering runway)
2. Smoothly apply full power – check engine gauges and announce “Engine Instruments Green”
3. As nose lifts off, ease back pressure (nose wheel must remain off the ground)
4. Lift off at lowest possible airspeed – remain in ground effect
5. In ground effect – accelerate to 60 KIAS (Vx) – begin climb
6. When clear of obstacles, accelerate to 76 KIAS (Vy)
7. Flaps 0
8. “After Takeoff Checklist” out of 1,000’ AGL

ENGINE FAILURE DURING TAKEOFF PROCEDURE

ENGINE FAILURE DURING TAKEOFF

THROTTLE.....idle
BRAKES.....apply

IF INSUFFICIENCT RUNWAY FOR COMPLETE STOP

WING FLAPS.....retract
MIXTURE.....idle cut-off
IGNITION SWITCH.....off
MASTER SWTICH.....off

ENGINE FAILURE AFTER TAKEOFF

AIRSPEED.....best glide 65Kt

If lower than 1000AGL – Continue straight ahead
If higher than 1000AGL – Consider return to airport

FUEL SELECTOR.....off
MIXTURE.....cutoff
MAGNETOS.....off
WING FLAPS.....as required
MASTER SWITCH.....off

GT AVIATION

CHAPTER 4

Arrival Procedures

ARRIVAL PROCEDURES

Cessna 172 Landing Criteria
The landing consists of five phases:

1. The final approach
2. The round out
3. The flare
4. The touch down
5. The after-landing roll out

Approach Briefing – Verbalize the Plan

Good Planning = Good Approach = Good Landing

During the Approach Checklist, conduct an approach briefing. This organizes the plan and ensures effective communication between pilots. The briefing should be specific to each approach and landing, but presented in a standard format that makes sense to your instructor, other pilots, and most importantly, yourself.

Approach Briefing Considerations:

- Landing Runway
- Traffic Pattern Altitude
- Traffic Pattern Entry
- Flap Settings
- Type of approach (Normal, Short-Field, Soft-Field)
- Winds (Left or right crosswind? Tailwind on downwind or base?)
- Final Approach Speed
- Aiming Point
- Touchdown Point

Example Landing Briefing:
"This will be a flaps-30, short-field landing on runway 24 at Potomac. I'll be making right traffic at pattern altitude of 1,100', entering on the 45-degree right downwind. Slight crosswind from the right. Final approach speed will be 60 KIAS, aiming at the numbers, touching down on the third centerline stripe. Any questions?"

This solidifies the plan between the student and instructor while visually identifying the aiming and touchdown points.

Note: Getting ATIS/AWOS, briefing the approach, and the Approach Briefing should be completed no later than 15 miles from the airport. Accomplishing these tasks as early as possible creates more time to focus on aircraft control and collision avoidance in the busy airport environment. During training flights when maneuvering near an airport, get ATIS/AWOS, brief, and complete the Approach Checklist as soon as the decision is made to return to the airport. DON'T WAIT!

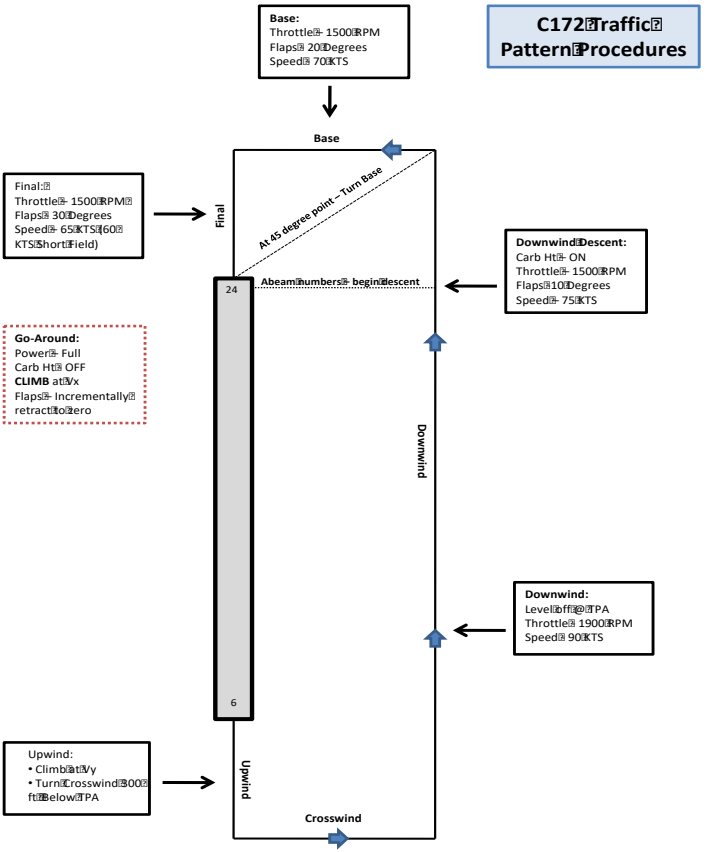
APPROACH/DESCENT

WEATHER.....check
APPROACH AND LAND BRIEF.....complete
CDI (IFR only) .....VLOC or GPS set
FUEL SELECTOR.....both
MIXTURE.....enrich
LANDING LIGHT.....on

Standardized Flaps 30 Approach & Landing

1. Complete the "Approach Checklist" before entering the airport area; devote full attention to aircraft control and traffic avoidance
2. Slow to 90 KIAS prior to entering downwind or traffic pattern.
3. Enter the traffic pattern at published Traffic Pattern Altitude (typically 1,000' AGL)
4. Complete the "GUMPS flow" and "Before Landing Checklist" when established on the downwind.
5. When abeam touchdown point (or when ready to descend out of pattern altitude on a straight in or extended downwind approach):
    a. Turn carb heat ON,
    b. Reduce power to approx. 1500RPM and
    c. Select flaps 10.
6. Descend out of Traffic Pattern Altitude on the downwind at 75 KIAS
7. On base leg, select flaps 20 and slow to 70 KIAS
8. On final, select flaps 30 and slow down to 65 KIAS

C172 Traffic Pattern Procedures



See Airplane Flying Handbook (FAA-H-8083-3B) Chapter 7 for info on traffic pattern entries

BEFORE LANDING

FUEL SELECTOR.....both
MIXTURE.....rich
PRIMER.....locked
SEAT BELTS.....on tight
CARBURETOR HEAT.....on below green arc

Short Field Approach & Landing (at KVKX)

Steps 1-7 are identical to the "Standardized Flaps 30 Approach & Landing" procedure.

8. Select Flaps FULL and slow to 60 KIAS on final.
   If not down by the first 1/3rd of the runway, execute a go-around
9. Retract flaps after touchdown
10. Simulate and announce "Max Braking" for training and check ride purposes.

Soft Field Approach & Landing

Steps 1-8 are identical to the "Standardized Flaps 30 Approach & Landing" procedure.

9. Touch down with a nose-high pitch attitude.
10. Maintain the nose wheel off the ground as airplane slows by increasing elevator pressure
11. Prevent nose wheel from rapidly falling by maintaining aft elevator pressure.
12. Exit the runway while maintaining full aft elevator pressure.

Crosswind Approach and Landing

The C172 POH/AFM recommends the Wing-Low method for best control during crosswind landings. Control technique involves establishing a crab angle to maintain the proper

ground track on final, then transitioning to the wing-low sideslip technique by no later than 200' AGL and below. The wing-low sideslip technique involves applying rudder to align the longitudinal axis with the centerline and applying opposite aileron simultaneously to maintain the aircraft's ground track over the centerline. This method prevents the airplane from touching down in a sideward motion and imposing damaging side loads on the landing gear.

Wing-Low Sideslip Method (Airplane Flying Handbook 8-4)

After landing, increase aileron input into the wind as the airplane slows to prevent the upwind wing from rising, reduce side-loading tendencies on the landing gear, and minimize the risk of roll-over accident due to the upwind wing lifting.

Note: The demonstrated crosswind component in the C172 is 15 knots. GT Aviation Aircraft may not operate beyond this demonstrated crosswind component. If a crosswind component beyond 15 knots exist or if the outcome of an approach or landing becomes uncertain, go-around and select another runway or airport with more suitable wind conditions.

Stabilized Approach:
Definition: A stabilized approach is one in which the pilot establishes and maintains a constant angle glide path towards a predetermined point on the landing runway. This depends on maintaining a constant final descent airspeed and configuration (FAA-H-8083-3A, p.8-7)

A stabilized approach is required during visual and instrument approaches in all GT Aviation airplanes. The airplane must be stabilized by:

- 400' AGL for a Visual Approach
- 1,000' AGL for an ILS Approach
- Descending from MDA for a Non-Precision Approach

General Conditions for a Stabilized Approach:

- Constant angle glide path: Proper descend angle and rate of descent must be established and maintained. All available landings aids (ILS, VASI, PAPI, etc.) must be used
- Aircraft in final landing configuration (Final approach speed and final flaps set)
- Airspeed must be stable and within range of target speed -5/+10 KIAS
- The aircraft will touch down within the first 1/3 of the landing runway. If this is not assured, a go-around must be executed

Go Around Philosophy
A go-around must be executed any time there is an un-stabilized approach. There are no exceptions for this rule. The decision to execute a timely go-around is both prudent

and encouraged anytime the outcome of an approach or landing becomes uncertain. GT Aviation considers the use of a go-around under such conditions as an indication of good judgement and cockpit discipline on the part of the pilot.

Further examples of unsatisfactory approach and landing conditions requiring a go around include but are not limited to:

- Possibility of a collision conflict with a departing or arriving aircraft
- Unexpected hazards on the runway or on final
- Instruction issued by ATC or CFI to go-around
- Anything that jeopardizes a safe approach and landing

If the thought "Should I go around?" crosses your mind even momentarily: GO AROUND!

Go-Around Procedure

1. Apply Full Power
2. Turn Carb Heat Off
3. Climb at Vx
4. Incrementally retract flaps to zero
5. "After Takeoff Checklist" out of 1,000' AGL if departing the traffic pattern.

Flap Retraction During Go-Arounds

1. Immediately retract flaps to 20 after applying full power and establishing a climb
2. Retract flaps to 10 when airspeed is greater than 55 KIAS
3. Retract flaps to 0 at 65 KIAS and clear of obstacles

Aiming Point
The Airplane Flying Handbook defines aiming point as "the point on the ground at which, if the airplane maintains a constant glide path, and was not flared for landing, it would contact the ground.

GT Aviation requires all landings to occur within the first 1/3 of the landing runway. When flying a visual approach, the aiming point chosen by the pilot is often an earlier point on the runway (approximately 300-400 before touchdown point) to account for the flare. The distance from the aiming point to touchdown point varies depending on the pilot's final approach speed (faster speed = longer flare).

Gust Factor
Slightly higher final approach speeds should be used under turbulent and/or gusty wind conditions. Add ½ of the gust factor to the normal final approach speed.

Example: Winds 240 @ 12 gusting 22 knots, the gust factor is 10 knots. Add ½ of the gust factor, 5 knots in this example, to the normal approach speed.

Seat Position
Correctly positioning the seat the same for each flight improves landing performance and safety. The seat high should be adjusted so the pilot can see the curvature of the cowling for the best sight picture during landing. Fore-aft adjustment is correct when the heels are on the floor with the balls of the feet on the rudder pedals, not on the brakes.

Proper foot position helps prevent inadvertent brake application during takeoff and ground operations.

The following should be committed to memory before your check ride:

- Plan and brief each landing carefully
- Enter the traffic pattern at TPA trimmed for 90 KIAS in level flight; landing profiles depend on this
- Whenever possible, fly the traffic pattern at a distance from the airport that allows for a power off landing on a safe landing surface in the event of an engine failure
- Whenever possible, maintain the specified flaps, power, and airspeed configurations on all segments of the traffic pattern
- Identify and maintain an aiming point (roughly 300-400 feet behind your designated touchdown point)
- Maintain final approach speed +10/-5 knots with a gust factor applied
- Approach must be stabilized by 400 feet AGL. If not, execute a go-around
- Manage the airplane's energy so touchdown occurs within 400 feet of your designated touchdown point with no side drift and with the airplane's longitudinal axis aligned with and over the runway centerline
- Touch down on the main gear, which the wheels straddling the centerline
- Maintain a pitch attitude after touchdown that prevents the nose wheel from slamming down by increasing aft elevator as the airplane slows

- Maintain centerline until taxi speed is reached and increase crosswind inputs as airplane slows.
- Adjust crosswind control inputs as necessary during taxi after leaving the runway

CHAPTER 5

In-Flight Maneuvers

IN-FLIGHT MANEUVERS

Before any maneuver:

1) Perform Pre-Maneuver checklist

PRE-MANEUVER CHECK
MANEUVERING AREA.....**clear**
REFERENCE POINTS.....**(Landmarks, Altitude, Heading, Airspeed) selected**
MIXTURE.....**as required**

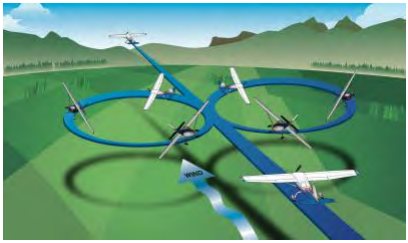
2) Verify maneuver is to be completed at a safe altitude

3) Verify aircraft is in the correct configuration

Clean Configuration	**Cruise Configuration**	**Landing Configuration**
- Carb Heat: Cold	Throttle: 65% BHP (2300 RPM)	- Carb Heat: On
- Mixture: Rich	Mixture: Lean	- Mixture: Rich
- Flaps: Up		- Flaps: Full

Steep Turns (PVT)

Roll into one coordinated 360 degree turn, then follow with another coordinated 360 degree turn in the opposite direction.



1. Cruise configuration
2. 95 KIAS (2300RPM appx)
3. Pick a reference point off the nose and note heading.
4. Roll into a 45° bank (once bank reaches 30°, add back pressure and add about 100-200 RPM to maintain airspeed and altitude. Add trim as desired.)
5. Begin rolling wings level around 20° before reference point (half the bank angle). Add forward pressure to prevent gaining altitude.
6. Clear traffic and perform a 360° turn with 45° of bank in the opposite direction.
7. "Cruise Checklist"

More bank = More lift required = More elevator back pressure

Private ACS Standards:

- Airspeed +/- 10 KIAS
- Altitude +/- 100'
- Bank 45°, +/- 5°
- Heading +/- 10°

Slow Flight (PVT)

1. Throttle: 1900 RPM (pitch back to maintain altitude and bleed off airspeed)
2. Below Vfe: Landing configuration flow (utilize flaps to increase drag and reduce airspeed)
3. Increase forward pressure to prevent ballooning during flap extension
4. Hold 5-10 knots above the stall warning horn (about 50-55 knots)
5. Trim off control pressures.
6. Utilize pitch and power to maintain airspeed and altitude

Descend: *@ 1500RPM (pitch for airspeed)*
Climb: *Full Power (pitch for airspeed)*
Level flight: *@ 50-60 KIAS: 1900RPM *approx. (do not pitch for airspeed in level flight)*
Turns: *add appx. 100-200 RPM to compensate for loss of the vertical component of lift*

Recovery:
1. Throttle: Cruise Power (2300 RPM)
2. Pitch: Adjust forward to maintain altitude.
3. Flaps: Incrementally retract (Utilize flaps to reduce drag and increase airspeed)
4. "Cruise Checklist"

Private ACS Standards:

- Airspeed +10/-0 KIAS
- Altitude +/- 100'
- Heading +/- 10°
- Bank +/- 10°

Power-Off Stall (PVT)

Entry:
1. Throttle: 1500 RPM (pitch back to maintain altitude and bleed off airspeed)
2. Below Vfe: Landing configuration
3. Establish a stabilized descent at approach speed (65 KIAS)
4. Throttle idle (slowly)
5. Level off at a specified altitude by increasing elevator back pressure
6. Maintain altitude to induce stall

Recovery (At stall/buffet):
1. Reduce AOA by decreasing elevator back pressure
2. Throttle: Full Power & Carb Heat Cold
3. Retract flaps to 20° (immediately)
4. Retract flaps to 10° when airspeed is greater than 55 KIAS
5. Increase pitch to arrest descent
6. Establish Vx
6. Retract flaps to 0° when accelerating through Vx
7. Level Off
8. "Cruise Checklist"

Private ACS Standards:

- Heading +/- 10°
- If in a turn: +/- 10°of Bank (Not to exceed 20°)

Power-On Stall (PVT)

Entry:
1. Throttle: 1500 RPM (pitch back to maintain altitude and bleed off airspeed)
2. Clean configuration flow
3. At liftoff speed (55 knots), simultaneously increase pitch (slowly) and apply full power
4. Slowly increase pitch attitude to induce stall (approx. 15-20°)
5. Rudder: Increase as speed decreases to maintain aircraft coordination

Recovery (At stall/buffet):
1. Reduce AOA by decreasing elevator back pressure (maintain coordination)
2. Pitch for a climb at Vx
3. "Cruise Checklist"

Private ACS Standards:

- Heading +/- 10°
- If in a turn: +/- 10°of Bank (Not to exceed 20°)

Emergency Descent

During a simulated emergency descent, the pilot must be able to recognize situations requiring an emergency descent, such as a cockpit smoke and/or fire. Situational awareness, appropriate division of attention, and positive load factors should be maintained during the maneuver and descent.

1. Throttle: Idle & Carb Heat ON
2. Initiate turning descent between 30 and 45 degrees of bank, while clearing for traffic
3. Maintain 120 KIAS
4. Level off at specified altitude
5. “Cruise Checklist” or “Emergency Landing Checklist” (As appropriate)

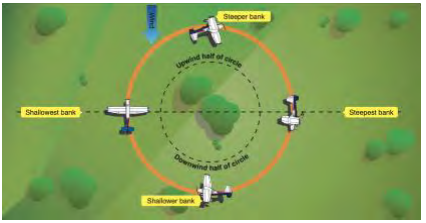
ACS Standards:

- +0/-10 KIAS
- Level off at specified altitude +/- 100’

Turns Around a Point / S-Turns (PVT)

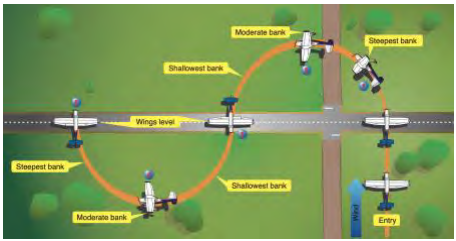
Higher Ground Speed = Steeper Bank
Lower Ground Speed = Shallower Bank

Turns Around a Point: This maneuver is a 360° constant radius turn around a single ground- based reference point. The goal is to adjust the bank angle during turns to correct for groundspeed changes and maintain a constant radius turn; steeper bank angles for higher ground speeds, shallow bank angles for slower groundspeeds while dividing attention between the flightpath, ground- based references, manipulating of the flight controls, and scanning for outside hazards and instrument indications.



1. Enter at an appropriate distance from the reference point, on the downwind, 700 to 1,000 feet AGL at an appropriate distance from the selected reference area
2. When abeam your point, begin maneuver with the steepest bank.
3. At 90° point, keep bank moderate.
4. At 180° point, keep bank shallow.
5. At 270° point, keep bank moderate.
6. When flying downwind, keep the bank at its steepest.
7. Exit maneuver on downwind

S-Turns: S-turns is a ground reference maneuver in which the airplane's ground track resembles two opposite but equal half-circles on each side of a selected ground-based straight-line reference.



1. Enter perpendicular (at a 90° angle) to the selected reference line, on the downwind, 600 to 1,000 feet AGL
2. When abeam your reference line, begin maneuver with the steepest bank.
3. At 90° point, keep bank moderate.
4. Once turning upwind, shallow bank to reach wings level exactly over the selected reference line fully perpendicular
5. Once over selected reference line, immediately start turn towards opposite direction (keep bank shallow on the upwind)
6. At 90° point, keep bank moderate
7. Once turning downwind, steepen bank to reach wings level exactly over the selected reference line fully perpendicular.
8. Exit maneuver on downwind.

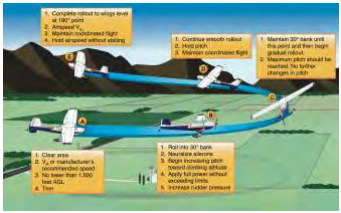
Note: Always select a location that is clear of obstacles, not over populated areas, and which serves as a good emergency landing site.

ACS Standards:

- Altitude: +/- 100'
- Airspeed: +/- 10 KIAS

Chandelles (Commercial Only)

Chandelles are to be accomplished at an entry altitude that will allow completion no lower than 1,500' AGL, and consist of one maximum performance climbing turn beginning from straight-and-level flight, and ending at the completion of a precise 180 degree turn in a wings-level, nose-high attitude at the minimum controllable airspeed.



1. 100 KIAS (2300RPM appx.) maintain altitude
2. Clean configuration flow
3. Choose a reference point off wing (90° point)
4. Establish & maintain 30-degree bank
5. Full Throttle – Increase pitch to attain approx. 12-15° pitch up at the 90° point

1st 90° turn, Bank = Constant, Pitch = Increasing to 12-15°pitch up

6. 90° Point – maintain pitch – reduce bank angle to attain level flight at 180° point

2nd 90° turn, Pitch = Constant 12-15° pitch up, Bank = decreasing to level flight

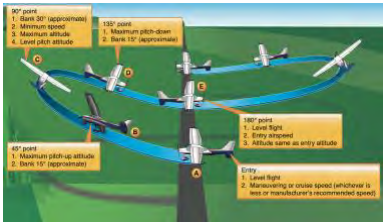
7. 180° point – wings level – minimum controllable airspeed
8. Level off and accelerate while maintaining level flight
9. "Cruise Checklist"

Commercial ACS Standards:

- Airspeed: Just above stall
- Heading: Rollout at 180-degree point +/- 10 Degrees

Lazy Eights (Commercial Only)

Lazy Eights are to be accomplished at an entry altitude that will allow the maneuver to be completed no lower than 1,500' AGL. The pilot is required to maintain coordinated flight throughout the maneuver, with a constant change of pitch and roll rate.



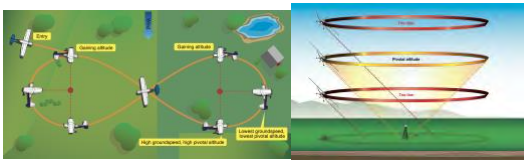
1. 100 KIAS (2300RPM appx.) maintain altitude
2. Cruise Configuration
3. Choose a reference point off the wing
4. Simultaneously increase pitch and bank (slowly)
5. 45-degree point – 15-degree pitch up and 15-degree bank
6. Reduce pitch / increase bank
7. 90-degree point – level pitch – 30-degree bank – min speed (5-10 knots above stall)
8. Continue reducing pitch and reduce bank
9. 135-degree point – 15-degrees pitch down – 15-degree bank
10. 180-degree point – level flight – entry airspeed and altitude
11. Repeat in opposite direction
12. "Cruise Checklist"

Commercial ACS Standards:

- At 180-degree point:
- Airspeed: +/- 10 KIAS
- Altitude: +/- 100'
- Heading: +/- 10-degrees

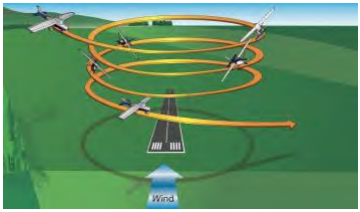
Eights On Pylons (Commercial Only)

Eights on Pylons are to be accomplished at the appropriate pivotal altitude (groundspeed^2/11.3), governed by the aircraft's groundspeed. The pilot is required to maintain coordinated flight while flying a figure eight pattern which holds the selected pylons using the appropriate pivotal altitude. At the steepest point, the angle of bank should be no greater than 40-degrees.



1. Enter pivotal altitude at 100 KIAS (2300RPM)
2. Clean Configuration flow
3. Select two pylons parallel to the downwind to allow for minimal time spent wings level between the two
4. Enter maneuver on a 45-degree midpoint downwind
5. Apply appropriate pitch corrections to compensate for changes in groundspeed (higher groundspeed = higher pivotal altitude, lower groundspeed = lower pivotal altitude) and;
6. To maintain line of sight reference with the pylon (pitch forward if point moves toward nose and pitch back if point moves toward tail)
7. Begin rollout to allow the airplane to proceed diagonally between the pylons at a 45-degree angle
8. Begin second turn in the opposite direction of the first
9. Exit maneuver on entry heading

Steep Spirals (Commercial Only)



1. Altitude: at least 3000’ AGL
2. Clean Configuration Flow
3. Chose visual reference point at 90-degree point
4. Reduce Throttle to Idle
5. Airspeed: Best Glide
6. Track at least three constant radius circles around reference point
7. Bank: Adjust for winds (not to exceed 60-degrees)
8. Clear engine once every 360-degree turn
9. Recover – roll out on specified heading (visual reference at same place where started)
10. “Cruise Checklist”

ACS Standards:

- Airspeed: +/- 10 KIAS
- Heading: Roll out towards specified heading or point +/- 10-degrees

Accelerated Stall (Commercial Only)

Accelerated stalls are accomplished at an altitude that allows completion no lower than 3,000' AGL. A smooth transition should be made from cruise attitude to a bank angle of 45-degree, maintaining coordinated turning flight, while increasing elevator back pressure steadily to induce stall.

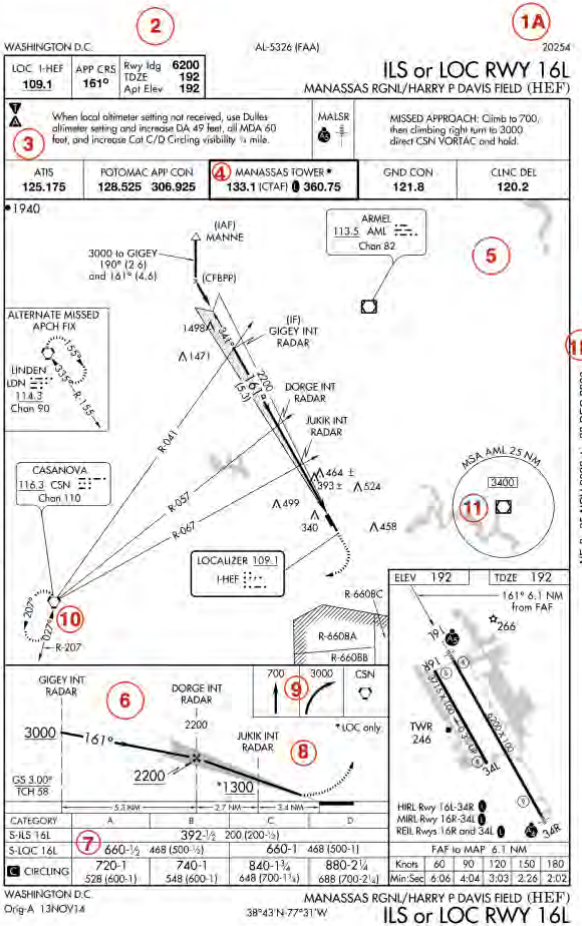
1. Slow to approximately 60 KIAS
2. Clean configuration flow
3. Established a coordinated 45-degree turn
4. Slowly reduce power to idle
6. Increase back pressure on elevator to maintain altitude (which will induce stall)
7. Recover at the onset (buffeting) stall condition
8. Simultaneously reduce AOA, max power, and level wings
9. "Cruise Checklist"

CHAPTER 6

IFR Configurations

Approach Briefing (IFR)

An approach briefing is a key procedural component in assuring that all aircraft systems and procedures related to an IFR arrival are properly set. An approach briefing also assures that the pilot (and co-pilot, if applicable) are fully aware of the key components of the approach including, but not limited to: the applicable DA/MDA's, Final/Initial approach fixes, missed approach procedure, and any other critical notes. Conducting a quick, but thorough approach briefing assures the pilot maintains constant situational awareness and thus increasing the level of safety and efficiency in conducting an IFR approach.



NE-3, 05 NOV 2020 to 03 DEC 2020

NE-3, 05 NOV 2020 to 03 DEC 2020

Approach Briefing Components:

1A/B. Verbally confirm that the approach plate is accurate to what is being flown as well as current.
- Do Item: Physically verify that the approach is loaded correctly on the GPS (for situational awareness)

2. Verbally confirm the runway lengths, TDZE, Apt Elevation, Final Approach Course, and Nav frequency.
- Do Item: Physically verify that the approach course is tuned on the CDI and that the applicable Nav frequency is tuned and identified on NAV 1

3. Verbally confirm any applicable notes. If not, announce *"no notes apply today"*.

4. Verbally confirm all applicable frequencies are tuned
- Do Item: Physically tune Tower, CTAF, or UNICOM frequency on the STDBY COM 1 slot, as well as ground or ATIS/AWOS frequencies on COM 2 (if applicable). This will ensure very limited time is spent switching frequencies once established on the approach.

5. Plan View: Verbally confirm where you are coming from, and what you will be doing. Example: "*We are approaching from the north, expecting Vectors to Final at DORGE"*

6. Profile View: Verbally confirm your minimum descent altitudes and final approach fix. Example: "One I'm cleared and established, I will cross DRDGE at 2,200', then step down to 1,300' at JUKIK.

7. Approach Minima: Verbally confirm approach minima including DA/MDA

8. Verbally confirm missed approach point (or DA if applicable)

9. Verbally confirm missed approach procedure
- Do Item: If missed approach requires tracking a secondary NAV source, tune frequency on NAV 2

10. Verbally confirm missed approach hold (if applicable), including entries (teardrop, parallel, or direct), and headings.

11. Verbally confirm the Minimum Sector Altitude

Note: Deviating from this format is encouraged. It is critical to develop a format that make the most sense and works best for you. However, one must make sure that such format is used in a *consistent* way. Approach briefings should not take more than 1 minute, allowing pilot to focus as much as possible on flying the airplane in IMC conditions.

Example Approach Briefing:

"I'll be conducting the ILS Runway 16L at Manassas. Runway Length 6200, Touchdown Zone Elevation 192, Airport Elevation is 192. Approach course is 161, which is set. Localizer frequency is 109.1, which is tuned and identified. No notes apply to us today. We are talking to approach, Manassas Tower on 133.1 set on the standby, Ground on

121.8 on Com 2. Coming from the northeast, expecting vectors to final at DORGE. Once clear and established, I can go down to 2,200' at DORGE, where ill intercept the glideslope and descent at 90KIAS down to my DA of 392. If I don't see the runway by then, I will go missed. Climb straight ahead to 700, then a right turn to 3000 direct to the Casanova VOR. Casanova VOR is set on NAV 2 frequency 116.3. It will be a teardrop entry, heading 237 for a minute then left turn 027 to enter. Left turns, one minute legs. Minimum Safe Altitude is 3,000'. Any questions?"

IFR Approach Configurations:

NON-PRECISION APPROACH (At the Final Approach Fix):
1500 RPM
FLAPS 10
90 KT
(700-800 FPM Descent Appx.)

PRECISION APPROACH (At glideslope intercept)**:**
1900 RPM
FLAPS 10
90 KT
(400-500 FPM Descent Appx.)

IFR Hold Entries

Pilots should always perform the 5 T's when entering a hold.

Turn: Fly towards desired track

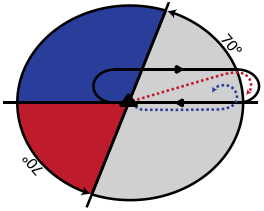
Time: Begin timer

Twist: Set the CDI to the appropriate course / select the appropriate navigation source (GPS or VLOC)

Throttle: Adjust power to maintain most fuel-efficient airspeed **or** reduce throttle to commence descend.

Talk: Advice ATC when "established in the hold".

HOLDING PROCEDURES



1 Minute Inbound Leg: ≤ 14,000'
Triple wind correction on outbound leg

FLY TO THE HOLDING FIX, THEN:

DIRECT ENTRY
Turn to follow the hold

TEARDROP ENTRY
Turn 30° into the hold for 1 min, then turn in the direction of the hold to intercept the inbound course

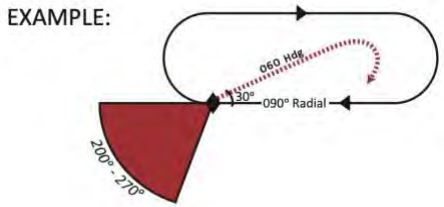
PARALLEL ENTRY
Fly a heading to parallel the hold outbound for 1 min, then turn (>180°) toward the hold to intercept the inbound course

STANDARD HOLD: RIGHT TURNS

Direct Entry:
When approaching the holding fix from anywhere in the grey sector, the direct entry procedure would be to fly directly to the fix, turn outbound and follow the holding pattern.

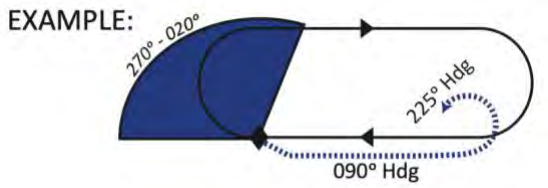
Teardrop Entry:
When approaching the holding fix from anywhere in the red sector, the teardrop entry is applicable. The teardrop entry procedure would be to:

1) Turn to outbound course +/- 30°
2) Time for 1 minute
3) Turn to and *intercept* the inbound course



Parallel Entry:
When approaching the holding fix from anywhere in the blue sector, the parallel entry is applicable. The parallel entry procedure would be to:

1) Turn to outbound course
2) Time for 1 minute
3) Turn to inbound course +/- 45° to *intercept* inbound course (For easier math, using 50° is acceptable).



CHAPTER 7

FLOWS

FLOWS

Introduction
A flow is a memorized procedure that prepares the aircraft for a certain aspect of a flight. A flow is **always** followed by a checklist. A flow consists of a list of operational tasks or checks, which are designed in an organized pattern to make the flow easier to learn, reduce heads down time, and avoid jumping/skipping.

How to Learn Flows
Flows should be committed to memory so they are performed effortlessly. It is important to learn the correct procedure and to correct any mistakes when learning the flow sooner rather than later. Flows can be practiced by writing the steps down, reciting the steps out loud, using a cockpit poster or by sitting in the aircraft. Before trying out your flows on a lesson, it's a good idea to practice in the aircraft (not in flight) or redbird to verify you've learned the flows completely and correctly.

The last item on every flow will **always** be a checklist. Flows must be memorized. **Checklists should not be memorized**. Proper usage and adherence to checklists ensures that no items are missed from a flow.

Flows Overview

There are four (4) flows we have provided for the Cessna 172P. The flow should be performed silently prior to performing the checklist. Once complete with the flow, you **must** verify your actions by **performing the checklist** out loud.

The four (4) flows are:

1. After Start
2. Final Items (Lights Camera Action)
3. Before Landing (GUMPS)
4. After Landing

After Start Flow

The after start flow should be performed immediately after starting the engine, adjusting the throttle to 1,000 RPM and verifying the oil pressure is green within 30 seconds. Upon completion of the after start flow, perform the "pre-taxi checklist".

1) Avionics Switch: On
2) Flaps: Retract Flaps to 0° after being extended for the preflight inspection. Verify both sides retract.
3) Mixture: Lean 1" (for taxi)
4) Transponder: Set. If necessary, enter the appropriate transponder code and verify the transponder is in ALT mode.
5) GPS, Radios, Flight Plan: Verify the GPS database is current and perform the GPS initialization. Load a flight plan into the GPS and verify the waypoints with an instructor, a passenger, or your navlog whenever possible. Enter or verify the radio frequencies in COM/NAV 1 and COM/NAV 2.
5) Weather/Radio Check: Obtain the ATIS/AWOS/ Weather conditions over the radio and listen for the direction of traffic. Record the winds, altimeter setting, and any other pertinent information. If applicable, perform a radio check.
6) Altimeter: Adjust and verify the altimeter setting.
7) Directional Gyro: Adjust and verify the directional gyro. The heading displayed on the directional gyro should match the compass heading.
8) Parking Brake: Release the parking brake and ensure your feet remain on the brakes to prevent undesired aircraft movement.

PERFORM THE "PRE-TAXI CHECKLIST"

Final Items Flow

*The before takeoff flow should be performed when the aircraft is #1 holding short of the runway and ready for takeoff. The final items flow should **always** be followed by the "Final items when #1 ready for takeoff" checklist.*

1) Lights: Turn on the Landing Light and Strobe Light if installed

2) Camera: Verify appropriate code and ATC frequencies are set and ensure transponder is in ALT mode

3) Action: Verify Mixture is RICH and Fuel Selector is on BOTH

4) Time: Record departure time or begin timer

5) Runway: Verbalize and verify the departure runway and final approach are clear of traffic and incursions. Announce intentions on CTAF/UNICOM or advise tower you're ready for departure

PERFORM THE "FINAL ITEMS WHEN #1 READY FOR TAKEOFF CHECKLIST"

Before Landing Flow (GUMPS)
*The before landing flow should be performed before the aircraft descends below 1000' AGL during final approach. The flow should **always** be followed by the "before landing checklist".*

1) Gas (Fuel Selector) Verify the fuel selector is set to the *"both"* position.
2) Undercarriage (Gear) Verify landing gear is indicating down and locked (not applicable in the Cessna 172. However, pilots should verify the gear is in a safe condition for landing.)
3) Mixture: Verify the mixture is set to *"rich"* or to the appropriate setting if landing at high density altitude airports.
4) Primer: Verify the primer is in and locked. (Pilots should use "Pumps" and "Prop" if applicable in this step when flying aircraft that are equipped with a fuel boost pump or with a constant speed propeller).
5) Switches/Seatbelts: Verify the landing lights are on and that the pilot's and passenger's seat belts are on.

PERFORM THE "BEFORE LANDING CHECKLIST"

After Landing Flow

The after landing flow should be performed once the aircraft is clear of the runway and the entire aircraft has passed over the hold short markings. Upon completion of the after landing flow, perform the "after landing checklist".

1) Runway: Verify the entire airplane is clear of the runway.
2) Flaps Up: Fully retract the Flaps to 0 degrees.
3) Mixture: Lean 1" (for taxi)
4) Carb Heat: Cold (IN)
5) Landing Light/Strobe Off: During the day, turn off landing light. At night, leave the landing light on or turn off landing light and turn on taxi light if available. Turn off strobes if strobes are installed day or night.
6) Trim Reset Takeoff: Adjust the trim wheel to the takeoff position

1) RUNWAY.....CLEAR
2) FLAPS.....RETRACT
3) MIXTURE.....LEAN 1"
4) CARB HEAT.....OFF
5) LIGHTS (LDG/STROBES).....OFF
6) TRIM.....SET FOR T/O

PERFORM THE "AFTER LANDING CHECKLIST"

GT AVIATION

CHAPTER 8

Oral Review

ORAL REVIEW

Oral Review:

1. What is the usable fuel for the Cessna-172-P?
2. What are the engine specifications for the C-172-P? (LHAND)
3. What type of flaps does the C-172-P have?
4. Describe the C-172-P Landing gear?
5. Describe the C-172-P Electrical System?
6. What are the C-172-P flaps powered by?
7. Describe the C-172-P Ignition system.
8. What type of stall warning system does the C-172-P have?
9. When should carburetor heat be used?
10. How many fuel vents does the C-172-P have?
11. How many fuel sumps does the C-172-P have?
12. What are the Private ACS standards for
    - Slow Flight
    - Steep Turns
    - Stalls (On & Off)
    - EMG Descend
    - Ground Reference Maneuvers
13. When should a short field takeoff/landing be executed versus a normal takeoff/landing?
14. When should an approach checklist be initiated?
15. What is the final approach speed for a short field landing?
16. List all C172P V-Speeds