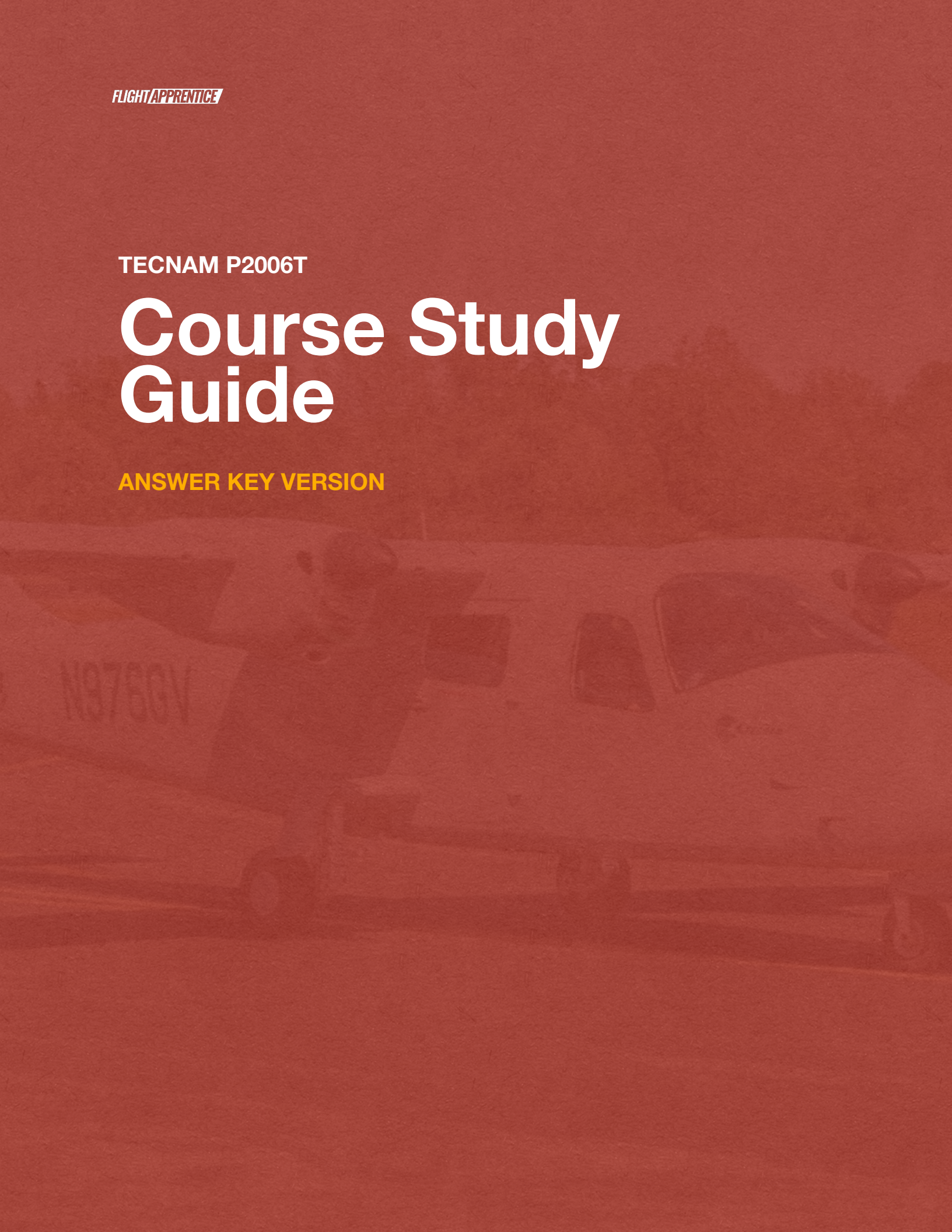
FLIGHT APPRENTICE

TECNAM P2006T

Course Study Guide

ANSWER KEY VERSION



Log of Revisions

Version	Date	Revisions
1	04/23/2022	Original
2	12/10/2022	Formatting; Fixed typos;

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Study Strategy

This guide contains a summary of the Tecnam P2006T Course flashcard questions, and is intended to be used in evaluating your own understanding of the course content. You should use it to recognize weak areas for further study.

1. Review your notes, flashcards, and any subject areas in which you know you're not fully prepared.
2. When you feel like you have a good grasp of general concepts, go through the Tecnam P2006T Course Study Guide (the one without the answer key). Write down your answers and mark questions when you don't know the answers.
3. Re-study the problem subject areas identified in step #2.
4. Once you again feel comfortable with all the subject areas, go through this document, (with the answer key) and verify you have the correct answers. Where you don't, go back through, study, and make sure you improve your understanding of those subject area(s).

We highly recommend thinking about the content on your own and discussing any questions with your instructor before consulting this guide for the "answers". **Although it is not the most enjoyable process, thinking critically about the subject is the best way to encourage long term retention of this information, which is the real goal.**

This guide is for informational purposes only. We've designed it to help pilots learn and apply concepts in the real world, and to improve their flight training efficiency. But it is not a substitute for time in an airplane with a flight instructor.

Overview

Differences From Other Light Twins

Does the Tecnam P2006T have a critical engine?

Yes. The left engine is critical.

What equipment item in ATOMATOFLAMES is different for the Tecnam P2006T than for most light trainers?

Temperature Gauge (because the P2006T has a liquid-cooled engine).

Are the engines direct drive?

No, they use a reduction gearbox to reduce propeller RPM.

Briefly explain the function and purpose of the door lock mechanism.

The locking mechanism uses an oil pressure sensor to lock the door when the engines are running to prevent pilots/passengers injuring themselves if they try to exit the airplane with engines running.=

What unique aspect of the quality makes P2006T performance calculations likely to include error?

Metric units.

Does the P2006T use fuel transfer?

No, fuel cross-feed only.

The P2006T gear system is relatively standard, with one very big exception. What is that exception?

The emergency extension system, which uses a pressurized accumulator to force the gear down.

Limitations

What type of operations is the P2006T approved for?

Day and Night VFR and IFR.

What is the maximum operating altitude?

14,000 feet

What is the minimum operating temperature?

-25ºC

What is the minimum pressure for the emergency landing gear accumulator?

20 Bar

Are spins permitted?

No.

What kinds of stalls are not permitted?

Whip stalls and stalls with one engine inoperative.

What are the flaps up loadfactor limits?

+3.8G and -1.78G

What are the flaps down loadfactor limits?

+2G and -0G

What is rotation speed in KIAS?

65 KIAS

What is V_Y in KIAS?

84 KIAS

What is V_X in KIAS?

72 KIAS

What is V_A in KIAS?

122 KIAS

What is VNE in KIAS?

171 KIAS

What is the maximum takeoff weight?

2,712lbs

What is the forward CG limit?

16.5% MAC

What is the maximum power?

98.6 horsepower at 2,388 RPM.

What is the maximum continuous power?

92.5 horsepower at 2,265 RPM.

When can oil pressure be 102 PSI indicated?

For a short period during a cold weather start.

What is the maximum fuel capacity?

52.8 gallons.

What is the normal operating range for the voltmeter?

12-14 Volts

Systems

Electrical

Describe the major components of the electrical system.

Two engine-driven generators, a battery, an external DC receptacle, and buses which are supplied in parallel.

How many buses comprise the electrical system? What are they?

Five buses: Battery Bus, L Avionics Bus, L Generator Bus, R Avionics Bus, R Generator Bus.

Under normal conditions, how are buses powered?

In parallel. Power is supplied by both generators and the battery.

What do the cross-bus switches do?

They isolate the L or R sides from the rest of the electrical system.

How long can the battery provide electrical power in an emergency?

30 minutes.

Is the P2006T electrical system AC or DC?

DC.

What is the battery voltage and amperage?

12-V and 38-Ah

How are the avionics buses powered?

By their respective Generator Bus.

What is the function of the field switches?

To allow the respective generator to supply power to the electrical system.

What is the purpose of the integrated generator regulator?

To maintain a constant output voltage and provide automatic over-voltage protection.

Can the starters engage with the master switch off? Why or why not?

Yes, if the airplane is powered with External DC power. The External DC power is supplied directly to the Battery Bus, regardless of master switch position.

Engines & Propeller

Describe the engine system.

The engines are Bombardier-Rotax GmbH 912 S3 models. They have liquid-cooled cylinder heads, air-cooled cylinders, and are lubricated with a dry-sump oil system. Crankshaft RPM is reduced via a reduction gearbox to lower propeller RPM.

How is the engine cooled?

Cylinder heads are liquid-cooled, and cylinders are air-cooled.

What is the purpose of the expansion tank?

To allow coolant to expand and cool.

What is the purpose of the overflow container?

When pressure is too high in the expansion tank excess coolant can flow to the overflow container and further expand and cool.

Why is the Rotax 912 liquid-cooled?

The Rotax 912 operates at such high RPMs that very high temperatures are generated which necessitates liquid-cooling.

Describe the oil system.

The oil system is dry-sump, with an engine-driven oil pump.

What is the maximum power rating?

Maximum power is 98.6 horsepower at 2,388 RPM. This power can only be maintained for 5 minutes. Max continuous power (no time limit) is 92.5 horsepower at 2,265 RPM.

How many carburetors does each engine have?

Two.

Describe the transit of a drop of coolant, starting at the radiator.

From the radiator, coolant moves through the engine-driven coolant pump, across the cylinder heads, and into the expansion tank. Some will flow to the overflow container and later back into the expansion tank, some will flow directly back to the radiator, cool, and repeat the cycle.

What force moves coolant from the overflow container back into the expansion tank?

Vacuum pressure created by a drop in coolant temperature/pressure.

Describe the transit of a drop of oil, starting at the radiator.

An engine-driven oil pump pulls oil from the reservoir to the engine. Along the way some of it will pass through the radiator and cool. After lubricating the engine, oil returns to the reservoir.

What advantage does MOGAS provide over 100LL?

Improved engine wear over time.

How is propeller pitch controlled?

Using a hydraulic-mechanical system. The propeller lever sets spring tension which meters oil flow to and from the propeller hub to maintain a constant speed.

If a propeller hub loses oil pressure, what pitch will the blades move to? What function drive this, and why is it built this way?

The blades will move to a high-pitch, low-RPM position to reduce drag and prepare the engine to be secured.

Fuel

What is the capacity of each tank? What is the total fuel capacity?

26.4 gallons per tank. 52.8 gallons total.

What is the total useable fuel capacity?

51.35 gallons.

How many drain points must be drained before flight?

Four. One gascolator drain and one wing tank drain per side.

What is engine cross-feed? How does it work?

Engine cross-feed is a feature that allows a pilot to supply an engine from the opposite-side tank (e.g. to power the left engine via the right fuel tank). Pilots start cross-feeding by directing the engine's fuel selector to the cross-side tank.

What is the difference between fuel cross-feed and fuel transfer?

Fuel transfer allows pumping fuel from one side tank to the other side tank (e.g. pumping fuel from left tank to right rank). Cross-feed allows a pilot to supply an engine from the cross-side tank (e.g. using the left side tank to supply the right engine).

Describe the fuel selector positions.

Each selector has three positions: left, right, and off. The left/right positions determine which fuel tank will supply that engine. The off position stops fuel flow to that engine.

How is the fuel fed from the tanks to the engine?

By engine-drive fuel pumps and (during critical phases) by electric auxiliary pumps.

Where is the fuel-sensing unit located?

On the inboard side of each tank.

Gear

Describe the landing gear system.

The landing gear is raised and lowered by a reversible electrical pump that pressurizes "up lines" or "down lines" that in turn move a piston mechanically connected to the gear.

How is the hydraulic pump powered?

Electrically.

How is the landing gear held up?

The gear is held up by hydraulic pressure.

If the landing gear fails to extend, what backup is available?

The emergency backup can be activated. The emergency system pushes hydraulic fluid into the top of each gear's cylinder, which lowers the gear.

What does a green landing gear light indicate?

The respective gear is down and locked.

What does a red landing gear light indicate?

The gear are not all down and locked nor all up.

What does an amber landing gear light indicate?

The electrical landing gear pump is being powered. Indirectly indicates an "in transit" status.

When will the gear warning horn sound?

When the flaps are lowered to FULL with the gear not down and locked.

What procedure is recommended by the POH in the event of a main gear that is not down and locked?

The POH recommends landing gear up if a single main is not down and locked. It also recommends shutting down the engines when landing is assured.

Flight Controls

Describe the primary flight control system.

The primary flight control system includes the stabilator, ailerons, and rudder.

What mechanism allows the pilot to move the primary flight controls?

Push-pull rods.

Describe the secondary flight control system.

Flaps and trim. Flaps and rudder trim are electrically powered. Pitch trim is manual, with an electrical option. Aileron trim is adjusted with a ground-adjustable tab on the left aileron.

Describe the pitch trim system.

The pitch trim wheel/switch moves the anti-servo tab in the rear, which in turn increases or decreases pressure on the trailing edge of the stabilator.

What is a stabilator? How does it differ from an elevator?

A stabilator is a moveable horizontal stabilizer. When the pilot increases or decreases pitch the entire stabilator moves.

What is an anti-servo tab?

An anti-servo tab dampens the movement of the stabilator for precision and improved feel. The anti-servo tab is mechanically linked to the stabilator and provides opposite pressure against stabilator movement. (For example if the pilot pulls back, the stabilator trailing edge moves up and the anti-servo tab trailing edge moves further up, counter-acting the input from the pilot). The anti-servo tab also functions as a trim tab.

How is the rudder trim controlled?

Electrically.

Describe the aileron trim system.

The aileron trim system consists of a ground-adjustable tab on the left aileron.

How are the flaps controlled?

Electrically.

Performance

Weight and Balance

What is the aircraft final weight and CG given the following? Does it fall within the CG envelope?

- Empty Mass Moment A/C — 2,734lbs
- A/C Empty Mass — 1,7041lbs
- Front Seats — 325lbs
- Rear Seats — 200lbs
- Fuel — 45gal
- Baggage — 80lbs

2,616lbs and CG not inside the envelope (overweight).

What is the aircraft final weight and CG given the following? Does it fall within the CG envelope?

- Empty Mass Moment A/C — 2,734lbs
- A/C Empty Mass — 1,7041lbs
- Front Seats — 425lbs
- Rear Seats — 340lbs
- Fuel — 48gal
- Baggage — 115lbs

2,909lbs and CG not inside the envelope (overweight).

What is the aircraft final weight and CG given the following? Does it fall within the CG envelope?

- Empty Mass Moment A/C — 2,734lbs
- A/C Empty Mass — 1,7041lbs
- Front Seats — 125lbs

- Rear Seats — 0lbs
- Fuel — 25gal
- Baggage — 5lbs

2,021lbs and CG within limits but near the very forward limit.

Takeoff and Landing Performance

What is the takeoff distance over a 50 foot obstacle, given the following?

- Weight — 2,712lbs
- Pressure Altitude — 2,500 feet
- Temperature — 25ºC
- Tailwind — 6 knots
- Runway — Paved
- Slope — .2% Up

2,530 feet.

What is the takeoff distance over a 50 foot obstacle, given the following?

- Weight — 2,712lbs
- Pressure Altitude — 500 feet
- Temperature — 5ºC
- Tailwind — 0 knots
- Runway — Paved
- Slope — Level

1,344 feet.

What is the takeoff distance over a 50 foot obstacle, given the following?

- Weight — 2,712lbs

- Pressure Altitude — 3,500 feet
- Temperature — 30ºC
- Tailwind — 5 knots
- Runway — Paved
- Slope — .2% Up

2,716 feet.

Cruise Performance

What is the fuel burn, power %, and true airspeed, given the following?

- Weight — 2,535lbs
- Pressure Altitude — 9,000 feet
- Temperature — -33ºC
- RPM — 2,100
- Manifold Pressure — 18”Hg

51%, 116 KTAS, 14.2 lt/hr

What is the fuel burn, power %, and true airspeed, given the following?

- Weight — 2,535lbs
- Pressure Altitude — 12,000 feet
- Temperature — -9ºC
- RPM — 2,250
- Manifold Pressure — 18”Hg

57%, 129 KTAS, 15.9 lt/hr

What is the fuel burn, power %, and true airspeed, given the following?

- Weight — 2,535lbs

- Pressure Altitude — 10,500 feet
- Temperature — -6°C
- RPM — 1,900
- Manifold Pressure — 18”Hg

47%, 116.5 KTAS, 12.9 lt/hr

Maneuvers

Preflight, Towing, Fueling

Why must pilots rotate the propeller during pre-flight?

Rotating the propeller forces oil through the system and is required to accurately check oil quantity.

What fluid levels must pilots check during pre-flight?

Oil quantity, fuel quantity, and coolant quantity.

What indicates that oil has been pumped through the system?

A murmur from the open oil tank.

What is the minimum required pressure for the emergency gear extension system?

20 Bar.

What unique procedure must be followed before towing the Tecnam P2006T?

The Master Switch must be on.

When towing, avoid moving the nose gear more than ___ degrees.

20º

Takeoffs

What normal flap setting is used for takeoffs?

Takeoff (15º)

Describe the typical climb profile

Rotate at 65 KIAS, retract the gear at Blue Line, retract the flaps at 400' AGL, climb to 1,000' AGL and then accomplish the climb check.

Maintain Blue Line until at least ____ feet.

1,000 feet.

What is the primary difference between a normal and short-field takeoff procedure?

In a short-field takeoff the gear is retracted immediately after establishing a positive rate of climb, and 72 KIAS is maintained until clear of obstacles.

Landings

Landings are usually accomplished with what flap setting?

Full (40º)

What is target speed for pattern entry?

100 KIAS

Describe the approach procedure from downwind to touchdown.

Enter the pattern at 100 KIAS. Abeam the numbers, descend out of TPA and accomplish the Gear Down Before Landing Flow Checklist. Maintain Blue Line. On base, perform the Approach Flow Check. On final slow to 71 KIAS and accomplish the final check.

How do the normal and short-field landing procedures differ?

On a short-field landing the flaps are retracted immediately after touchdown and max braking should be used or simulated.

What is the go-around procedure?

1. **Propellers full forward**
2. **Throttles to max power**
3. **Retract flaps to T/O setting (15º)**
4. **Establish VX or VY as appropriate**
5. **Retract the gear at positive rate**
6. **Retract remainder of flaps on climbout**
7. **Climb at Blue Line**

What should pilots do before increasing manifold pressure on a go around?

Increase propeller RPM.

Stalls

How is approach to stall recognized?

Reduced control effectiveness.

How is impending stall recognized?

Buffeting and the stall warning horn.

Describe the power-off stall procedure.

Pre-maneuver Checklist, make a simulated approach, reduce power to idle and transition to a normal landing attitude. At the onset, recover by

reducing AOA, setting max power, and leveling the wings. Then perform a go-around, ending with a Cruise Flow Checklist.

Describe the power-on stall procedure.

Pre-maneuver Checklist, choose and enter a configuration, slow to rotation speed, set a normal climb pitch while increasing power to 19" MP. Recover at the onset by lowering AOA, setting max power, and leveling the wings. Clean up on schedule and end with a Cruise Flow Checklist.

What configuration(s) is/are used for a power-on stall?

Either a departure configuration (gear up, flaps 15º) or a takeoff configuration (gear down, flaps 15º).

In what sequence are configuration changes made in stall recoveries?

1. **Reduce flaps to 15º.**
2. **Retract gear at positive rate of climb.**
3. **Retract remainder of flaps above Blue Line.**

Steep Turns

What power setting is used for steep turns?

22" MP and 2250 RPM, adding 1-2" MP in the turn.

Engine Failure

Where can intentional shutdowns for training purposes be performed?

At least 4,000 feet AGL over an area where a safe landing might be made if the engine fails to restart.

Given sufficient time, what general procedures should pilots follow after experiencing and engine failure?

1. **Maintain aircraft control**

2. Identify the failed engine
3. Troubleshoot flow/checklist
4. Securing flow/checklist

Engine Restart

What considerations influence whether or not a pilot should attempt to restart a failed engine?

If severe damage or fire is present/suspected the pilot should probably not restart the engine.

V_{MC} Demo

What is the purpose of the V_{MC} Demo?

It demonstrates the pilot's ability to maintain aircraft control in a low-speed regime with one engine inoperative, and recover from momentary loss of directional control.

Drag Demo

What is the purpose of the Drag Demo?

It demonstrates the effect of airplane configuration change on total drag and handling characteristics with one engine inoperative.

Single-Engine ILS

What are the major differences between a single-engine and two-engine ILS approach?

The main differences are that pilots need to anticipate and correct for aerodynamic changes during power, configuration, and profile changes.

They should also consider, adjust to, and brief decreased performance during a go-around.