

HOW TO USE THIS MANUAL

The lessons are presented in numerical order just as you will fly them. It is your responsibility to be prepared for each lesson so that you will get the most out of the training hours offered. The homework questions presented below will ensure an understanding of the maneuver/operation to be covered in each lesson. The questions will also ensure you are knowledgeable in all the appropriate areas of the Commercial Pilot Practical Test Standards (PTS) and help you prepare for your final stage check. This manual does not provide specific text and page references for each lesson. By now you, the aspiring commercial pilot, should have an extensive aviation library consisting of the AIM/FAR's, aircraft POH's, Private, Instrument and Commercial PTS's, and all required texts from private, instrument and commercial ground school. You should also be familiar enough with this material to look up required information without the Aviation Department providing specific page references!

10-1

The lesson is complete when the student can perform basic ground reference maneuvers while maintaining a specified altitude and ground track. The student will display the correct understanding of the necessary control inputs during entry to, performance of and recovery from the steep power turn and chandelle.

HOMEWORK:

1. When starting a chandelle, you altitude should be no lower than _____ feet AGL
2. Explain each part of the emergency landing procedure.
3. _____ (True/False). The heater, defrost and cabin vents should all be open in case of an engine compartment fire.
4. _____ controls altitude during MCA.
5. List classes and duration's of medical certificates.
6. What flight time must be logged? What are the currency requirements for carrying passengers and flying under instrument conditions?
7. Define "AROW"
8. What is an AD, who issues it and how is it different from a factory service bulletin?
9. How many inspections are required on the Arrow, and when are they due? How many logbooks does the Arrow have? (Recommend you and your instructor visit the hanger and get a first hand look at the Arrow logbooks)

10-2

At the completion of the flight, the student should display a working knowledge of the airplane systems. Additionally, the student should display at least a private pilot proficiency in performance of basic flight operations.

HOMEWORK:

1. Describe and diagram how a constant speed propeller works.

2. Describe and diagram how the landing gear in the Arrow works, including safety/gear warning features and troubleshooting gear problems.
3. Describe the fuel system in the Arrow. Also describe differences, advantages and disadvantages of carbureted versus fuel injected engines. What is the impact of using a lower octane fuel than is specified in the POH?
4. Be able to tell your instructor what pieces of radio/nav equipment each antenna on the Arrow is connected to.
5. _____ (True/False). During "hot" starts the Arrow needs to be primed with fuel.

10-3

This lesson is complete when the student has conducted the assigned flight. The student should attempt to gain proficiency in the planning of each maneuver.

HOMEWORK:

1. Because of reduced aileron effectiveness during a stall, _____ should be used to help maintain directional control.
2. A stall will occur when the wing reaches _____.
3. To act as pilot in command of an aircraft under Part 91, a commercial pilot must have accomplished a flight review within the preceding _____ months.
4. Pilots who change their permanent mailing address and fail to notify the FAA Certification Branch within _____ days may not exercise the privileges of their pilot certificate.
5. Describe how a turbocharger works, and what it does for performance. Include the function of the waste gate, definition of critical altitude and advantages of having an intercooler on a turbocharged engine.
6. Describe the oil system on a typical general aviation airplane. How is oil circulated and cooled, what gauges help you monitor the oil system?
7. Describe and diagram the typical electrical system in a general aviation airplane. What are the major components? What are the differences, advantages and disadvantages of a generator versus an alternator?

10-4

This lesson is complete when the student has conducted the assigned flight. During the flight, the student should attempt to increase proficiency in the smooth and accurate performance of the listed flight maneuvers in a complex airplane.

HOMEWORK:

1. Gear-up V(y) in the Arrow is _____ mph.
2. Best glide speed in the Arrow is _____ mph.
3. The main functions of flaps during the approach and landing is to _____.
4. The performance table of the aircraft for takeoff and climb are based on _____ altitude.
5. Diagram the pitot/static system, including p/s instruments, a description of how these instruments work and what happens to each with a pitot or static port blockage. How are the instruments affected if the alternate static source is opened?
6. Describe the vacuum and gyro instruments in the Arrow, including the gyroscopic principle on which the function of each instrument is based.

7. Describe the heating and cooling systems in the Arrow.
8. Describe the difference between deicing and anti-icing systems and give an example of each type of system.

10-5

Steep power turns will be maintained within +/- 150 feet and bank angle and recovery heading within +/- 15 degrees. The student will demonstrate the correct procedures for performing the chandelle. During takeoffs and landings, the student will demonstrate correct airspeed control technique's.

HOMEWORK:

1. During a steep power turn, you normally continue the maneuver through a series of at least _____ 360 degree turns.
2. _____ (True/False): There is no particular advantage to applying full power before brake release on a short field takeoff.
3. The obstruction height for a short field approach and landing is usually considered to be _____ feet.
4. What is an MEL and how do you obtain one? What is the main benefit of having an MEL?
5. What is an STC? What is a "one time field approval?"
6. If an aircraft doesn't have an MEL, what are the requirements for flying with inoperative equipment?
7. Under what circumstances would you ask for a special flight permit, and who would you ask? Must the permit be onboard the aircraft for the flight?

10-6

This lesson is complete when the student has conducted the assigned maneuvers. During the lesson the student should attempt to minimize the transition and setup time between each maneuver.

HOMEWORK:

1. Describe the procedure for performing a steep power turn. Include Commercial PTS standards for completion.
2. Recommended bank angle mid-way through a chandelle is _____ degrees.
3. To recover from a very steep, nose-low spiral with increasing airspeed the first thing you should do is _____.
4. In most cases, the short field approach and landing requires you to use _____ flaps.
5. How and to which agencies can you give a PIREP? What is the difference between a UA and a UUA?
6. A pilot reports wind shear on final, causing a 15 knot airspeed reduction. Based on this, how would you fly the approach?
7. What are the different types of SIGMET's: Who issues them and how often?
8. Same question for AIRMET's. What are the letter designators for each type of AIRMET? In addition to icing forecasts, what other information is contained in an icing AIRMET?
9. What type of aircraft do SIGMET's and AIRMET's apply to?
10. Learn how to use the WSI weather terminal in Cruise Aviation. What current and prognostic charts are available on the system? What text products are available? Strongly

recommend you spend a few minutes at this terminal prior to every flight. These terminals are standard at many FBO's.

10-7

The student should show increased proficiency in the review maneuvers by demonstrating correct entry and recovery procedures and increased coordination during the performance of each maneuver. The student also will demonstrate an understanding of the important performance elements of lazy eights, and eights on pylons.

HOMEWORK

1. During a lazy eight, at the 45 and 135 degree points in the turn, your bank angle should be approximately _____ degrees.
2. While performing eights on pylons, you should maintain
 - a. a constant bank angle
 - b. the entry altitude and airspeed
 - c. the entry altitude, but you can vary airspeed
 - d. the entry airspeed, but you can vary the altitude.
3. During eights on pylons, you maintain a constant aim point by varying the _____.
4. _____ (True/False) Pivotal altitude during eights on pylons varies as your bank angle changes.
5. List primary and secondary flight control systems on the Arrow? How is pitch control and pitch trim different between the Arrow and the Aerobat?
6. Obtain a user ID and password to log onto DUATS. If you don't have a personal computer or can't use a computer in the library, get assistance to use your instructor's office computer.
7. Using DUATS, get a standard weather briefing from OUN to ABI.
8. Extra Credit: Using prompts from DUATS, load the performance profile for the Arrow into your DUATS account, and then get a DUATS generated computer flight plan for the OUN to ABI trip.

10-8

During the performance of this lesson, the student should demonstrate commercial pilot proficiency. Any maneuvers which do not meet this standard will be assigned for additional practice.

HOMEWORK:

1. How do taxi procedures on a soft field differ from those on a hard surface?
2. _____ (True/False): During the flare for a soft field landing, you should use at least a minimal amount of power to help control the descent.
3. You've just gotten your commercial license (with instrument rating): What type of commercial flight operations are you allowed to perform?
4. If the operational category of an airplane is listed as utility, it would mean that this airplane could be operated in which of the following maneuvers?
 - a. Limited aerobatics, excluding spins.
 - b. Limited aeobatics, including spins.
 - c. Any maneuver except aerobatics and spins.

5. Describe the following aspects of each class of airspace, including TRSA's:
 - a. Dimensions/location
 - b. Equipment required for entry
 - c. Pilot certificate requirements for entry
 - d. ATC contract requirements prior to entry
 - e. VFR weather minimums

10-9

This lesson is complete when the student has conducted the assigned flight. During the flight, the student should attempt to increase proficiency in the smooth and accurate performance of the listed flight maneuvers in the complex airplane.

HOMEWORK:

1. Describe the go-around procedure in the Arrow.
2. In what section of the POH would you find the equipment list? Adding additional equipment does/does not decrease an aircraft's useful load.
3. During the first part of a soft field takeoff roll, weight on the nose wheel should be _____.
4. Describe the following types of Special Use Airspace:
 - a. MOA's
 - b. Alert Areas
 - c. Restricted Areas
 - d. Prohibited Areas
 - e. Low Altitude Training Routes. What is the significance of the number of digits in the route identifier?

10-10

This lesson is complete when the student has accomplished a solo review of each of the listed maneuvers.

HOMEWORK:

1. Best angle of climb in the Arrow (gear down) is _____ mph.
2. During takeoffs, the prop control lever should be in the _____ position.
3. During power decreases in the Arrow, the _____ should be reduced first, followed by the _____.
4. The POH recommended approach speed in the Arrow is _____ mph.
5. Describe the symptoms, causes, effects and corrective actions of the following:
 - a. hypoxia
 - b. hyperventilation
 - c. middle ear and/or sinus problems
 - d. spatial disorientation
 - e. motion sickness carbon monoxide poisoning
 - f. stress and fatigue

10-11

This lesson is complete when the student displays an understanding of night flight and the associated normal and emergency procedures

HOMEWORK:

1. Describe the emergency landing procedure for a night flight when a landing is not possible at an airport.
2. Diagram the human eye, indicating locations and function of the pupil, lens, retina (including location of rods and cones).
3. How does the eye accommodate/adapt to changing light. As light levels decrease, what happens to the effectiveness of the rods and cones? How do you change your scanning procedures to accommodate these changes?
4. What are some typical illusions that occur during night flight and how do you overcome them?
5. Why is the eye more susceptible to hypoxia at night? At what altitude will night vision be impacted by lack of oxygen?

10-12

This lesson is complete when the student has conducted the solo night flight. During the flight, the student should attempt to gain proficiency in takeoffs and landings in the night environment. After this lesson the student will have completed 10 takeoffs and landings in a traffic pattern at an airport with an operating control tower.

HOMEWORK

1. Describe the position and anti-collision lighting system on the Arrow.
2. Describe how you would use a VASI and a PAPI on an approach.
3. How can you tell if an airport has PCL and how do you activate it?
4. Describe the different types of airport beacons.
5. If you inadvertently look into a bright light, how long will it take to restore your night vision?

10-13

The student's increase in night proficiency to that of a commercial pilot will be evident during the post flight evaluation. The student will thoroughly explain the additional operational aspects and safety considerations which are associated with night flight.

HOMEWORK

1. What are some additional considerations in performing a preflight at night?
2. Describe how the runway lighting system at OUN lets you know how much runway is remaining on your rollout. This is available at most runways that have _____ approaches.

10-14

This solo lesson is complete when the student has conducted the assigned flight. During the flight, the student should attempt to attain or maintain commercial pilot proficiency.

HOMEWORK

1. Describe how to do a Chandelle. Include Commercial PTS standards for completion.
2. How do you determine whether an over-the-counter drug is safe to use prior to flight?
3. What are the concerns with flying after scuba diving and what does the AIM say about time between scuba diving and flying?
4. Define the Acronym IMSAFE.

10-15

During the performance of each of the listed maneuvers, the student should demonstrate commercial pilot proficiency. Any maneuvers which do not meet this standard will be assigned for additional practice.

HOMEWORK

1. Describe how to do a Lazy 8. Include Commercial PTS standards for completion.
2. Your radios fail in the practice area.
 - a. What transponder code do you squawk?
 - b. At what altitude do you enter the pattern at OUN?
 - c. How do you acknowledge receipt of light gun signals?
 - d. You're on the 45 to the downwind and see a steady red light. What do you do?
 - e. You're on the upwind leg of your circle and see a flashing green light. What do you do?
 - f. You're on downwind and see a steady green light. What do you do?
 - g. You're on final and the steady green suddenly changes to flashing red. What do you do?
 - h. You've just touched down and see a flashing red light. What do you do?
 - i. You've taxied off the runway and see a flashing green light. What do you do?
 - j. You're approaching a runway intersection and the flashing green light changes to steady red. What do you do?

10-16

The student will correctly perform holding pattern entries, wind correction and leg timing for both standard and non-standard holding patterns. All voice communications will be both appropriate and timely, compliance with radar vectors instructions will be accurate, and instrument approaches will meet instrument pilot standards.

HOMEWORK

1. What purpose does the outer marker serve on an ILS?
2. When holding, WCA on the inbound leg should be _____ on the outbound leg.
3. While holding, your inbound leg is 30 seconds. Time on your outbound leg should be ____ seconds.
4. You are inbound on the LOC Rwy 03 at OUN. Prior to starting the approach, AWOS reports ceiling 400, visibility 2 miles and wind 180 degrees at 10 knots. Tower advises you to circle west to land on runway 17. Can you legally shoot the approach? If not, is there anything you can request from tower that would allow you to shoot the approach?
5. Same question as above, except wind is 030 at 10 knots and Rwy 03 is active. After crossing Sooner intersection, Tower advises visibility has dropped to ½ mile.
 - a. You must immediately execute the missed approach.
 - b. You may continue the approach.

6. You're on the NDB 03 approach at OUN and at the MDA spot the ALS directly below just before arriving at the beacon.
 - a. You should proceed to the beacon and execute the missed approach.
 - b. You may pull the power, point the nose down, establish a 2000 fpm descent and roll into a 60 degree bank—whatever it takes to land is OK.

10-17

This lesson will be complete when the student has conducted the assigned solo flights. During each flight, the student should attempt to perform lazy eights with symmetrical loops and eights-on-pylons, chandelles and steep power turns with smoothness and coordination.

HOMEWORK

1. Describe how to do eight's-on-pylons. Include Commercial PTS standards for completion.
2. What are the categories and classes for aircraft?
3. Describe the impact of exceeding maximum gross weight on aircraft performance.
4. Describe the impact of a forward CG on aircraft performance and stability.
5. Describe the impact of an aft CG on aircraft performance and stability.

10-18

This lesson is complete when the student has conducted the assigned flight. During the flight, the student should attempt to increase proficiency in the smooth and accurate performance of the listed flight maneuvers in the complex airplane.

HOMEWORK

1. Describe how to perform a steep spiral. Include the commercial PTS standards for this maneuver.
2. Describe how to perform a 180 degree power-off accuracy approach and landing. Include the commercial PTS standards for this maneuver.
3. Under Part 91, at what altitudes must crew and passengers use supplemental oxygen in an unpressurized aircraft?
4. Describe the different supplemental oxygen regulator systems and the altitude ranges in which they can be used.

10-19

At the completion of this lesson, the student should be thoroughly familiar with the flight characteristics, systems and emergency procedures associated with the complex airplane. The student will demonstrate pilot-in-command proficiency.

HOMEWORK

1. As altitude increases, the same indicated airspeed equates to a higher/lower true airspeed.
2. As temperature increases, the same indicated airspeed equates to a higher/lower true airspeed.
3. Higher density altitudes equate to longer/shorter takeoff and landing distances.
4. Stronger headwinds equate to longer/shorter takeoff and landing distances.

5. As an airplane gains altitude the indicated airspeed at which it stalls increases/decreases/remains the same and the true airspeed at which it stalls increases/decreases/remains the same.

10-20

This lesson will be completed when the student has conducted the assigned solo flight. During the flight, the student should attempt to increase accuracy and coordination on the listed maneuvers.

HOMEWORK

1. What is the maximum load factor that should occur while performing steep power turns?
2. Describe two different types of cabin pressure control systems for pressurized aircraft. Include the function of the exhaust and safety valves.

10-21

All VFR maneuvers will be performed according to FAA practical test standards.

HOMEWORK

1. Describe how to enter and exit MCA in the Arrow. Include Commercial PTS standards for completion.
2. Describe how to do power on and power off stalls in the Arrow. Include Commercial PTS standards for completion.

10-22

This lesson is complete when the student can perform each of the listed maneuvers to the minimum performance standards outlined in the current FAA commercial pilot practical test standards.

HOMEWORK

1. Describe how to do short field takeoffs and landings in the Arrow. Include Commercial PTS standards for completions
2. Describe how to do soft field takeoffs and landings in the Arrow. Include Commercial PTS standards for completion.