Rod Machado's Private Pilot Flight Training Syllabus

Based on Traditional Stick and Rudder Flying Skills

Picture: © dekanaryas

Rod Machado's Private Pilot Flight Training Syllabus

No written word
Nor moral plea,
Can teach young hearts
What they should be,
Nor all the books
Upon the shelves,
But what the teachers
Are themselves

Updates: On 4-30-2017 All references to the *Airport/Facility Directory* were changed to read: *Digital Chart Supplement* (d-CS). Lesson 13 article titled *Vertigo* was added.

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Private Pilot Flight Lessons Overview

LESSON 1. DUAL FLIGHT (Ground 1.2/Flight 1.3)
LESSON 2. DUAL FLIGHT (Ground 1.2/Flight 1.3)
LESSON 3. DUAL FLIGHT (Ground 1.2/Flight 1.3)
LESSON 4. DUAL FLIGHT (Ground 1.2/Flight 1.3)
LESSON 5. DUAL FLIGHT (Ground 1.2/Flight 1.3)
LESSON 6. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Takeoff and Landing Practice
LESSON 7. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Takeoff and Landing Practice
LESSON 8. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Takeoff and Landing Practice
LESSON 9. DUAL AND FIRST SOLO FLIGHT (Ground 1.2/Flight 1.3) – First Solo
LESSON 10. DUAL AND SECOND SOLO FLIGHT (Ground 1.2/Flight 1.3) – Review and Second Solo
LESSON 11. DUAL AND THIRD SOLO FLIGHT (Ground 1.2/Flight 1.3) – Review and Third Solo
LESSON 12. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Review All Basic Pre–solo Maneuvers
LESSON 13. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Instruments Basic Skills
LESSON 14. SOLO FLIGHT (Flight 1.3) – Practice Area Solo Flight
LESSON 15. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Instruments Basic Skills
LESSON 16. DUAL FLIGHT (Ground 1.2/Flight 1.3) – VOR/GPS Navigation
LESSON 17. SOLO FLIGHT (Flight 1.3) – Practice Area Solo Flight
LESSON 18. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Basic Instruments and VOR Navigation
LESSON 19. FIRST DUAL CROSS–COUNTRY FLIGHT (Ground 1.2/Flight 1.5) – Dual Cross-Country Flight
LESSON 20. SOLO FLIGHT (Flight 1.3) – Review Maneuvers and Navigation Practice
LESSON 21. SECOND DUAL (LONG) CROSS-COUNTRY FLIGHT (Ground 1.2/Flight 3.0) – Dual XC
LESSON 22. SOLO CROSS-COUNTRY FLIGHT (Flight 1.5) – First Solo XC Flight
LESSON 23. DUAL NIGHT FLIGHT (Ground 1.2/Flight 1.3) – Local Night Flight Introduction
LESSON 24. SOLO CROSS-COUNTRY FLIGHT (Flight 1.5) –Second Short Solo Cross-Country Flight
LESSON 25. DUAL (LONG) NIGHT CROSS-COUNTRY FLIGHT (Ground 1.2/Flight 2.3) – 100 NM Dual Night XC
LESSON 26. LONG SOLO CROSS-COUNTRY FLIGHT (Flight 2.5) –
150 NM/Landing More Than 50NM/With 3 Full Stops
LESSON 27. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Practice Flight Test Maneuvers
LESSON 28. SOLO FLIGHT (Flight 1.3) – Practice Flight Test Maneuvers Solo
LESSON 29. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Practice Flight Test Maneuvers
LESSON 30. SOLO FLIGHT (Flight 1.3) – Practice Flight Test Maneuvers Solo
LESSON 31. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Practice Flight Test Maneuvers
LESSON 32. SIMULATED PRACTICAL FLIGHT TEST (Ground 1.2/Flight 1.3)

Total flight time – 46.1 Hours
Solo – 12.2 Hours
Solo XC- 5.5 Hours
Dual IFR training – 3.9 hours
Dual night training – 3.6 hours

FAR Requirement for the Private Pilot Certificate

FAR §61.109 Aeronautical experience.

(a) For an airplane single–engine rating. Except as provided in paragraph (k) of this section, a person who applies for a private pilot certificate with an airplane category and single–engine class rating must log at least 40 hours of flight time that includes at least 20 hours of flight training from an authorized instructor and 10 hours of solo flight training in the areas of operation listed in §61.107(b)(1) of this part, and the training must include at least—

(1) 3 hours of cross–country flight training in a single–engine airplane;

(2) Except as provided in §61.110 of this part, 3 hours of night flight training in a single–engine airplane that includes—

(i) One cross–country flight of over 100 nautical miles total distance; and

(ii) 10 takeoffs and 10 landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport.

(3) 3 hours of flight training in a single–engine airplane on the control and maneuvering of an airplane solely by reference to instruments, including straight and level flight, constant airspeed climbs and descents, turns to a heading, recovery from unusual flight attitudes, radio communications, and the use of navigation systems/facilities and radar services appropriate to instrument flight;

(4) 3 hours of flight training with an authorized instructor in a single–engine airplane in preparation for the practical test, which must have been performed within the preceding 2 calendar months from the month of the test; and

(5) 10 hours of solo flight time in a single–engine airplane, consisting of at least—

(i) 5 hours of solo cross–country time;

(ii) One solo cross-country flight of 150 nautical miles total distance, with full–stop landings at three points, and one segment of the flight consisting of a straight–line distance of more than 50 nautical miles between the takeoff and landing locations; and

(iii) Three takeoffs and three landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower.

Introduction to the Flight Instructor

This private pilot flight training syllabus was designed to help you prepare your students to become safe and responsible private pilots. It wasn't designed to help them become airline pilots or super-pilots. Becoming private pilots is the typical first step if your students want to advance and become one of these mighty aviators. When the regulations governing pilot certification were written long ago, it was decided that 40 hours of flight training was the minimum level of experience the average person needed to exercise the privileges of a private pilot certificate.

It turns out that the 40-hour training minimum is as valid today as it was in the past. After all, today's airplanes are no more difficult to fly than they were decades ago. Let's remember that the 40-hour minimum was created when the typical training airplane was a taildragger, which is a bit more challenging to land than the tricycle-geared airplanes that are common today. Sure, many of today's airplanes have advanced avionics, which increases flight training times. The avionics package, however, has nothing to do with how easy or difficult the airplane is to fly. So you can make the case that earning a private pilot certificate today is certainly no more complex than it was decades ago, as long as the training airplane has traditional (steam gauge) flight instruments.

So why is it that so many instructors believe that aviation has become more *complex* over the years?

Let's set the record straight on this issue. Just because someone says it, doesn't make it true. The fact is that aviation has become more *comprehensive* over the years, but not more complex. It's true that more ground knowledge is required to fly an airplane, however this does not mean that the knowledge is *complex,* just relatively *comprehensive*. Ask any instructor who has been around for more than three decades about concepts such as *airport traffic areas, control zones,* and *Class 1, 2* and *3 Terminal Control Areas* and he or she will gladly testify to the complexity of those terms relative to today's comparable terms of *Class D, Class E* and *Class B* airspace. That fact is that if aviation were really that complex, we wouldn't see too many 16 year old high school students soloing airplanes. Yet, we do see quite a few youngsters taking to the air.

Comprehensive knowledge (not complexity) is why this flight training syllabus is heavily front loaded with homework, while the flying content is primarily focused on the fundamental physical, perceptual and cognitive skills necessary to fly the airplane safely. These skills haven't changed since the early days of aviation. That's why this syllabus projects a 46.1 hour completion time for the private pilot certificate. If you train your students properly, and they fly at least two times a week (preferably three) and faithfully do the homework, there's no reason at all they can't obtain a private pilot certificate within this time frame.

I call this a *minimalist syllabus* because it focuses primarily on learning the *stick and rudder* skills necessary to fly safely. In the process of teaching these basic flying skills, you (the instructor) explicitly and *implicitly* impart those values that will keep your students safe for a lifetime of flying. I'm speaking of values that support such principles as the exercise of good judgment, risk management, situational awareness and so on. The psychological name for this type of *implicit* information transfer is known as *role modeling*. An instructor's behavior as a role model in conjunction with a practical training syllabus and effective training materials have made it possible for hundreds of thousands of pilots to learn to fly safely for a lifetime.

Unfortunately, many of today's aviation syllabi focus on what I call *fantasy flight training*. I'm speaking of the commonly recommended flight training scenarios where the instructor engages in a *play-pretend* mission during the conduct of a flying lesson. For example, instructors might have their students pretend that the mission of an upcoming cross-country flight is to transport an ice chest containing a human heart to a patient waiting at a distant hospital. The intent is to arouse the student's emotions and create an atmosphere that replicates a real-to-life decision-making environment. Unfortunately, while these imaginary scenarios might look good on paper, they actually do very little to support the student's learning progress. In many instances, they hinder it.

Today's form of scenario-based training is very similar to the *whole language* reading movement that pervaded elementary schools throughout the 20th century. In the early part of the 20th century, John Dewey

and Edmund Burke Huey professed that simply exposing students to the words in books would lead to understanding their meaning as well as their proper pronunciation. This conception is similar to the scenarios used in today's version of fantasy fight training, which professes that exposing student pilots to *higher order learning* actually teaches the *basic fundamentals* on which that learning is based. The *phonics method* of learning to read, however, is based on associating sounds with letters, which leads to the correct pronunciation and understanding of words. Phonics training begins with the most basic level of information possible. It then builds higher levels of learning from that. This is similar to the stick and rudder method of flight training which uses elemental building blocks of knowledge to teach students how to fly.

Ultimately, *whole language reading* resulted in generations of students who couldn't read. Now you know why generations of pilots (airline pilots, too) never learned the essentials of stick and rudder flying. It's the reason the FAA recently said that airline pilots need to learn (and relearn) these basic skills. Those who insist on using fantasy flight training scenarios are simply *wishing* for good results in training, while those who teach the building blocks of stick and rudder flying are actually *having* good results in flight training.

Please don't get me wrong here. Scenario-based training is certainly valuable, but when it prevents or distracts instructors from teaching the basic elements of flying. The basics *do not* require pretend scenarios to be learned properly. It's only when one has assimilated the basic fundamentals of flying and can correlate them with higher knowledge that scenario-based training becomes effective. Instrument training, commercial training and beyond certainly do benefit from realistic and practical scenario based training.

On the other hand, there's absolutely nothing wrong with creating those experiences that support learning the basic fundamentals of how to fly an airplane. The FAA, in their 1971 *Flight Instructor Handbook*, encouraged instructors to use *contrived experience* to teach these flying fundamentals. Contriving experience is the *proper* method of helping students learn the basics of any discipline. For instance, a contrived experience is practicing slow flight when there's no practical need to slow the airplane down. You practice it to learn it. Every contrived experience found in this syllabus involves a practical aspect of flying the airplane without the use of fantasy scenarios. When you pull the power on a student to simulate an engine failure, the movement of the airplane earthward is not imagined. It's real. Stall practice, slow flight, cross-country training, instrument flying, among others, are all forms of contrived experiences designed to simulate real world events and the decision making skills necessary to handle them safely. Contrived experience (not fantasy flight scenarios) is how you teach the *basics* of flight to primary students.

"Wait a minute," you say, "Shouldn't we be teaching judgment and decision making?" Yes, of course. Keep in mind that decision-making, judgment, situational awareness, and risk assessment are also known as *knowledge.* A very large portion of this knowledge can and should be learned on the ground via ground school, classroom lectures, books, videos, recordings, eLearning courses and so on. This is why this syllabus is heavily dependent on assigned homework, and not just the homework needed to pass the FAA's knowledge exam.

While the intent behind today's version of scenario-based training is noble, the desired results are disappointing. In the end, these play-pretend scenarios not only seem a bit silly, they distract and delay students from their final objective of obtaining a private pilot certificate. This is one reason why the average flight time required to obtain a private pilot certificate today is well over 70 hours (and that's for a Part 141 school. Part 61 training times are actually much higher according to the FAA). It's also why it often costs more than $15,000 to obtain a private pilot certificate at many airports today.

Finally, another reason it takes over 40 hours for most dedicated students to become a private pilots is that we've forgotten the original objective of flight training. That objective is to teach students the skills necessary to fly safely enough so that they can continue to learn on their own. Isn't that why we say that a private pilot certificate is a *license to learn*? It's *not* a license that says a private pilot has learned everything. It's simply not possible to teach your students everything in a private pilot curriculum. It is possible, however, to teach your students enough of the right things so they can learn more on their own, and do so safely.

I wish you great success in using this flight training syllabus. Feel free to modify it to accommodate your student's and your particular needs. It's only a guide, but it's an effective one.

Use of Microsoft Flight Simulator in This Syllabus

You'll notice my recommendation that all primary students study the lessons I created in the *Microsoft Flight Simulator X* software. I created those lessons to reflect how I teach in the real airplane. To the degree that it's possible to replicate this teaching method on a computer, those lessons offer your students a chance to accelerate their rate of learning.

Contrary to what you might think, it's not necessary to have rudder-pedal hardware to use these lessons either—although I would recommend purchasing this hardware. These flight simulator lessons don't require the use of rudder pedals, but once the instructor touts rudder pedal usage in the airplane, the student will certainly benefit by having them available to use at home. (Please remember to have the student uncheck the "control coordination" feature in Flight Simulator if rudder pedals are installed.)

To understand what a powerful tool Microsoft Flight Simulation software is for flight training, make sure you read the article titled, *The Power of Simulation* found in Appendix-1, Lesson-4. You'll read about how one student learned to takeoff, fly to the practice area, talk with ATC, return to the airport and land with only two demo flights in his logbook and without having any previous flying experience.

Over the years I've heard story after story about how *Microsoft Flight Simulator* has helped student pilots learn quicker, more efficiently, and at less cost. Yes, there are always some who suggest that using a simulator at home can teach bad habits (without proper guidance, this is entirely possible). More often than not, bad habits are taught by the (less than stellar) flight instructor, and not the simulator.

So make use of this device as a teaching tool for your students. If you want to take the flight training you offer to the next level, you can actually use the simulator's multi-player features to observe how your students fly their personal simulator at home. You can observe them on your computer screen while chatting with them on the phone. One innovative instructor even offers flight lessons to the uninitiated using this method. Imagine that? Teaching at home in your bathrobe while drinking a soda pop!

Required Study Materials

A headset (preferably a noise cancelling headset but these are a little pricey – used is OK, too)
Cushions – for the student to see above the instrument panel (you can make your own, too)
Rod Machado's Private Pilot Handbook (book or ebook—or optional *Audiobook*
Rod Machado's How to Fly an Airplane Handbook (book or ebook)—or optional *Audiobook*
Rod Machado's Private Pilot eWorkbook (ebook only)
Rod Machado's Plane Talk (book or ebook)
Mechanical E6-B computer, plotter, logbook
Sectional and terminal area chart (if appropriate) for training area
Airmen Certification Standards (the newer version of the *Practical Test Standards*)
AIM – Aeronautical Information Manual (get combo FAR and AIM if possible)
Microsoft Flight Simulator X with either joystick or yoke and pedals (rudder pedals optional)

Rod Machado's Web Site: www.rodmachdo.com

Notes and Incidentals

How this syllabus is laid out: As you'll notice, this syllabus requires students to do a lot of homework, perhaps 10 hours or more a week. There's nothing unreasonable about that if the student wishes to save a great deal of money on flight training. The new *Airmen Certification Standards* (ACS) are integrated into this syllabus. You'll see that most homework assignments require that the student read the appropriate section of the ACS relevant to an upcoming lesson. I fully understand that the student might not be able to answer some of the risk assessment questions posed in the ACS prior to the lesson, and that's just fine. The objective here is to help the student understand what to look for in the upcoming lesson regarding risk assessment and risk management.

Homework Assignments: At the bottom right or each lesson, students will find their homework assignment *for the next lesson*. Let me say that again, the block titled, *Homework Assignment* is the homework the student is expected to complete by the next lesson. The block labeled *Lesson Philosophy* is for you, the instructor. This information is for you and is relevant to the lesson on which the block appears. I've assembled quite a few articles that I've written for flight instructors over the years and suggest those that are relevant to the lesson. These are the ones that you should read before giving this lesson.

Student Training Schedule: My personal recommendation is for the student to train at least three times a week with each lesson spaced by at least two days. It will take that much time to do the homework between lessons. Two lessons per week is just fine too, but this does extend the training time by a few hours. Remember, a student can earn a license in close to the minimum time but only if that student is willing to do the assigned homework.

Covering Instruments: During the first lesson, I make it a point to cover the six basic flight instruments with soap-dish holders (you can use a *Post-it* or anything else that works, of course) once you're airborne. I have the student fly this way for a substantial portion of this lesson and subsequent portions of other lessons. In particular, when I introduce a new maneuver, such as steep turns, I typically introduce it with the six primary instruments covered up. This allows me to reinforce the concept of *Attitude + Power = Performance* and disabuse my student of the notion that the instruments are necessary to actually fly the airplane. They're not. The flight instruments help pilots fly with greater precision, but it's the relationship between attitude and power that governs the flight of an airplane. This is what I want my students to understand in the deepest way possible. It's the basis of *stick and rudder* flying.

Knowledge Exam: I require my students to pass their private pilot knowledge exam before they fly the long cross-country flight. I don't want them out on their own without having established that they have at least studied all the required materials that private pilots need to know.

Ground School: The required homework assignments in this syllabus corresponds quite closely with the nine-week ground school syllabus found in the rear of *Rod Machado's Private Pilot Workbook*. If you elect to teach a ground school class for students on your own (and I hope you do), please take a look at this ground school syllabus. I've outlined the ground training for your flight student in a very similar way to the one shown in this ground school syllabus.

Analog vs. Glass Cockpits: This syllabus was primary designed for use in airplanes with analog (steam gauge) fight instruments. It can be used for glass cockpit airplanes but I certainly do favor avionics simplicity during the formative hours of flight training. If you have a choice, I'd recommend training your students in airplane with analog instruments. After your students earn a private pilot certificate, they can easily transition to an airplane with a more complex avionics package.

Lesson Schedule: You'll notice that I allot 1.2 hour for ground training and 1.3 hours for flight training. Generally speaking, pre- and post-flight ground training should last as long as the actual lesson, if not longer. Of course, there's simply no way to be more precise about these values since training times vary based on a number of factors. Nevertheless, it's reasonable to schedule 2.5 hours of total training per student, which typically gives the full-time instructor a chance to fly with three students a day. Of course, you can fly more if

you wish, but this schedule tends to work well for most instructors who want a happy family life. Keep in mind that this is 2.5 hours of *revenue time* based on your hourly instructional rate. With a lunch break between students, this schedule works out to a nice, full day of instruction.

Phase Checks: I don't make a provision for phase checks, in this syllabus. I have nothing against them, and since this is a Part 61 syllabus, phase checks are not required as part of the curriculum. On the other hand, if you work with an instructor who is a good teacher that you respect, then consider offering your student a phase check prior to solo and prior to the check-ride. More than anything, this adds to the student's level of confidence.

Ground School or Self Study: Should your student take a "classroom" type ground school or study at home to pass their knowledge exam? If there is a good, live, nine-week ground school taught by an experienced instructor in your area, then I recommend this method of study. There's nothing quite as good as being able to interact with students and instructors in this type of ground school. Unfortunately, most university-type ground schools take one semester to complete. If the student takes this type of class before beginning flying lessons, then this is just fine. More often, the semester type ground school doesn't work well with most flight training programs. Yes, the student can study a written test prep course at home, but these type of courses need to be supplemented with additional materials if the student wishes to have a good understanding of aviation. On the other hand, I offer books and audiobooks that make learning fun and interesting. Used in conjunction with my *Private Pilot Workbook* and my interactive eLearning courses, the student will find learning about aviation fun, comprehensive and enjoyable. To gain extra practice with test questions, I recommend one of the many good knowledge test guides on the market today.

Part 61 vs. Part 141 Training: This syllabus is designed for flight training under Part 61 of the FARs. Part 61 gives the instructor a lot more flexibility in how he or she conducts training. Part 61 or 141 makes no practical difference in terms of the education a student receives as long as that student has picked a good instructor with which to train. Period!

Making a Living as a CFI: In case you haven't noticed, I'm a big fan of flight instructors. I'm also a big fan of you making good money while doing it. I certainly did when I was teaching full time. If you'd like to learn how I did it, read the article at the very beginning of Appendix-1 titled, *Making a Living as a CFI*. I'll show you the business strategy I used to make this work.

Then there's the issue of how much you should charge. I hope you charge what you're worth and I hope you're worth what you charge. If you are, then you can command a much higher hourly rate with the promise that your student will ultimately spend much less total money on the instructor over the course of his/her training. That's right. If you're that good, then your student will learn quicker and spend less on his or her private pilot certificate. Sure, you won't have as many revenue flights with this student, but that means you'll have more time to fly with other students at the same "higher" hourly rate. That means you ultimately end up making more money.

Pre-study Requirement

Before your students begin flight training, you should recommend the following course of pre-study to help accelerate their progress and minimize the cost of training. Keep in mind that this isn't really an unusual request, either. In fact, it's not unheard of for students to begin flight training after they've already passed their private pilot knowledge exam. While I don't require passing the knowledge exam before beginning flight training, I do recommend that your students at least do the homework listed in the box below.

Pre-lesson Work Assignment

PRIOR TO THE FIRST LESSON:
Rod Machado's How to Fly Handbook Read: Chapters 1 and 2– Preflight, Straight and Level Flight
Rod Machado's Private Pilot Handbook
Chapter 2 - Pages B1-25, *Aerodynamics*
Chapter 3 - Pages C1-9, *Engines*
Rod Machado's Plane Talk
Chapter 11 (All), *Understanding your CFI's Brain* Pg-239
Rod Machado's Private Pilot Workbook
Answer corresponding questions in Workbook:
Microsoft Flight Simulator
Student Pilot Lessons:
Lesson 1: *Straight and Level Flight*
Lesson 2: *Turns*

LESSON 1. DUAL FLIGHT (Ground 1.2/Flight 1.3)

Objective: Familiarize students with the airplane and its operating procedures, the sensations of flight, the local practice areas, the use of the flight controls, and the four fundamentals of flight. There is no reason whatsoever that the first lesson can't be an intensive learning session. So make it one if the students are willing. If the students adapt well, then by the end of this lesson, they should have a rudimentary grasp of straight and level flight, climbs, turns, and descents. Let students do as much or as little on this lesson as they wish. Do, however, encourage them to take the controls and fly under your direction.

1. Airplane familiarization
    a. Preflight inspection
    b. Check weather/wind before takeoff
    c. Cockpit familiarization/hand-feet placement on controls
    d. The airplane flight manual
    e. Explain positive change of flight controls
    f. Emphasize use of checklist (for start and runup phases)
    g. Place a "level," "climb" and "descent" dot on windshield
2. Starting the engine – Demo
    a. Engine care after start–RPM/oil pressure
3. Radio communications – Demo
4. Taxiing/navigating on airport – Demo/Do
5. Pre-takeoff check/Runup – Demo
6. Takeoff, traffic pattern, and climbout – Demo/Do
    a. See and avoid procedures, clearing turns – Demo/Do
7. Familiarization flight – Demo/Do (cover panel -if feasible)
    a. Identify practice area – Demo
    b. Elevator pitch control – Demo/Do
    c. Rudder yaw control – Demo/Do
    d. Aileron roll control – Demo/Do
    e. Throttle control – Demo/Do
    f. Rudder and aileron coordination – Demo/Do
    g. Trim control – Demo/Do
    h. Demo airplane stability – Demo/Do
    i. Emphasize flight by feel and attitude – Demo/Do
    j. Straight and level flight – Demo/Do
    k. Turns, right and left – Demo/Do
    l. Climbs – Demo/Do
    m. Power-off descents – Demo/Do
    n. Climbing turns – Demo/Do
    o. Descending turns – Demo/Do
    p. Power-off stall (imminent, not full) – Demo only
    q. Traffic pattern, parking, securing airplane – Demo/Do
8. Postflight discussion
9. Preview of next lesson
    a. Straight and level, climbs, turns, and descents
    b. Slow flight and power-off stalls
    c. Medium and steep turns
    d. Assign homework

Lesson Philosophy

- This is the student's first official lesson and you want to make it count. Begin the lesson discussion with an explanation about *trust* as described in the following article: *First Lesson Etiquette* (Appendix-1).
- A large portion of this first lesson can and should be done with the entire panel covered. You can place a towel over the panel or Post-its or some circular, view-limiting device (think "soap dish holders") over the six instruments. You should only do this if you feel comfortable flying the airplane this way and if you don't need to look at any specific instrument. I'm a big fan of teaching this way, since it emphasizes the concept of *Attitude + Power = Performance*. I don't make this an official part of this syllabus since I realize that not everyone teaching is comfortable flying without his/her instruments—unfortunately!
- One of the important things to do on this lesson is to let your student fly as much as he/she wants to, if he/she is willing. Sometimes instructors hoard the controls and don't trust themselves to let the student fly. Read about this in the article titled, *Control Hogs* (Appendix-1).
- Given your seating position in side-by-side seating airplanes, you can actually help your student learn a bit faster using the strategy outlined in the article titled, *Hand to Hand* (Appendix-1).
- Make sure you emphasize "pitch" attitude control by use of the windscreen dots you made before takeoff.
- Introduce students to ACS (*Airmen Certification Standards*) during the post-flight briefing. Do not emphasize maneuver tolerances during this flight. You want to emphasize attitude control, not instrument "values" on this lesson.

Next Lesson Homework

Rod Machado's How to Fly Handbook
Chapter 3 – Climbs and Descents
Chapter 4 – Pages 1-8, Slow Flight
Rod Machado's Private Pilot Handbook
Chapter 2 - Pages B26-48, *Aerodynamics*
Chapter 3 - Pages C9-38, *Engines*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.

Microsoft Flight Simulator
Student Pilot Lessons:
Lesson 5: Takeoffs; Lesson 3: Climbs and Descents

Completion Standards: By the end of this lesson, the student should have a basic understanding of the four basic fundamentals of flight as well as how to operate the flight controls, trim, and throttle. At the end of this lesson, some students will easily be able to fly straight and level, make turns as well as straight climbs and descents.

LESSON 2. DUAL FLIGHT (Ground 1.2/Flight 1.3)

Objective: Students should acquire basic skills at performing the four basic flight maneuvers (straight and level, climbs, turns, and descents) without assistance. Students should be introduced to and allowed to practice entering and exiting slow flight without flaps, entry and recovery from basic power-off stall, and coordination rolls and steep turns. By the end of this lesson, students should be able to taxi without assistance.

1. Preflight discussion – Review, as required
    a. Review homework assignment
    b. Risk management: PAVE, IMSAFE, weather, passenger briefing, etc.
    c. Attitude + Power = Performance (discuss in detail)
    d. Crosswind control placement - taxiing – Demo/Do
2. Starting engine & Radio procedures – Do with CFI assistance
3. Taxiing – Do
4. Pre–takeoff check – Do with CFI assistance
5. Takeoff and exit traffic pattern – Do with CFI assistance
    a. Identify left turning tendency on takeoff/climb – Demo/Do
    b. Emphasize windscreen dots for attitude control – Demo/Do
    c. Emphasize see and avoid/clear all turns – Demo/Do
    d. Area familiarization – Demo
6. Straight climbs – emphasize "Attitude + Power = Performance"
    a. Two climb attitudes: Best rate and cruise climb attitude – Demo/Do
7. Straight and level – Demo/Do
    a. High cruise (XC flight) and low cruise (downwind) flight conditions
8. Medium turns (20°-45°) – Demo/Do
9. Turns to headings
10. Climbing turns
11. Slow flight – Demo/Do
12. Use of trim in all flight conditions – Demo/Do
13. Power-off stalls (imminent/full) – Demo/Do
14. Steep turns – Demonstration only
15. Coordination rolls – Demo/Do
16. Descents and gliding turns – Do
    a. Two descent attitudes: Normal and best glide attitude – Demo/Do
17. Descents at 1.3 Vs (approach simulation, no flaps) – Demo/Do
18. Approach, traffic pattern, and landing – Demo
19. Taxiing and parking – Directed performance
20. Postflight discussion
21. Preview of next lesson
    a. Constant airspeed descents
    b. Variable airspeed descents
    c. Varying descent rate with power with constant airspeed
    d. Descents with flaps
    e. Takeoff, traffic pattern, and departure.
    f. Coordination exercises
    g. Assign homework

Lesson Philosophy

- As you've noticed, I've listed a minimum of 1.2 hours of ground instruction for every lesson. This is a minimum and I do encourage you to do more, and I expect that you'll be paid for it, too. Read the article titled, *Why Ground Instruction is Important* in Appendix-1.
- I can't emphasize enough how important it is for you to act the way you want your student to behave in the cockpit. You are the role model, meaning that you're the one primarily responsible for forging your student's outlook on safety. Read *A Matter of Influence* in Appendix-1.
- It's very helpful for instructors to remind students of important points with memorable phrases. These phrases tend to stick in a student's mind. Learn more about this by reading the article, *Sounding Like a Sage* in Appendix-1.
- During this lessons you can introduce ACS tolerances as a means of evaluating a maneuver.
- When emphasizing the concept of *Attitude + Power = Performance* in this lesson, it's wise to cover the panel instruments occasionally to teach the student that it's what he or she sees outside the cockpit that's important, and not let them learn to rely solely on their flight instruments.

Next Lesson Homework

Rod Machado's How to Fly Handbook
Chapter 4 – Pages 9-26, Slow Flight
Rod Machado's Private Pilot Handbook
Chapter 4 - Pages D1-16, *Electrical System*
Chapter 5 - Pages E1-18, *Flight Instruments*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.

Microsoft Flight Simulator

Student Pilot Lessons:
Lesson 4: *Slow Flight*
Lesson 1: *Stalls*

Completion Standards: By the end of this lesson, the student should be able to perform the four basic fundamentals of flight in any combination as well as entering and exiting slow flight without flaps, all without assistance from the instructor. The student should be able to transition from a high cruise (100 knots in a typical small airplane) to 1.3 Vs (final approach speed with no flaps) and trim the airplane for that condition. Unassisted basic power-off stall recovery should be within the student skill range at this point.

LESSON 3. DUAL FLIGHT (Ground 1.2/Flight 1.3)

Objective: During this lesson, the student should attain reasonable proficiency in the performance of the four basic flight maneuvers, and learn to perform without assistance slow flight, power–off stalls, and coordination rolls. The student will gain skill at slowing the airplane down to approach speed, trim for that speed, and then descend at that speed in a trimmed condition. Adjusting descent rate with power is introduced and practiced here, too. A basic ground reference maneuver is also introduced here. In this lesson, and hereafter, the student should be responsible for the preflight inspection, starting, radio communications, taxiing, and parking without direction from the instructor, except in unusual circumstances or in new, unfamiliar situations.

1. Preflight discussion – Do/CFI review
   a. Review homework assignment
   b. Introduce aviation decision making concepts (DECIDE), including the passenger briefing
   c. Cockpit management
2. Engine start/radio communications/taxi – Do
3. Crosswind takeoff procedures – Demo/Do
4. Takeoff – Do
5. Traffic pattern and departure – Do
   a. Emphasis on "see and avoid" procedures - Do
6. Climbs and climbing turns – Do
7. Level–off from climbs and glides – Do.
8. Straight and level, shallow (0°-20°), medium (20°-45°), and steep turns (45°) – Do
9. Coordination rolls – Do
10. Speed changes in level flight: vary airspeed between high and low cruse flight – Demo/Do
11. Slow flight at MCA – Do (* See note in box below)
12. Power–off stalls – Do
    a) Secondary stalls – Demo/Do
13. Constant Airspeed power–off descents and turns – Do.
14. Variable airspeed descents – Demo/Do
15. Variable rate descents at constant airspeed – Demo/Do
16. Relationship between elevator and throttle in constant rate descents
17. Descents with partial/full flaps at 1.3 Vs – Do
18. Following a road and flying a rectangular course – Demo/Do
19. Airport approach and traffic pattern – Directed performance
20. Postflight discussion
    a) Lesson review
    b) Servicing the airplane
21. Preview of next lesson
    a. Power–on stalls
    b. Ground reference maneuvers
    c. Landing approaches
    d. Elementary forced landings
    e. Assign homework

Lesson Philosophy

- Having trouble getting your student to do his/her homework? Read the following article: *Communications as Teaching* in Appendix-1.
- Need a little more help getting a student to do homework? Read the article titled: *Homework: A Question and Answer* in Appendix-1.
- Since your student will be responsible for the preflight after this lesson, you might want to ensure that he/she has a good recollection of how to do this by making a preflight video. Read the article titled: *Preflight Video* in Appendix -1.
- One of the very big secrets of teaching someone basic motor skills is to find a way to memorize a specific physical behavior. There are several ways to do this. Read about one of them in the article titled: *Suburi Training* in Appendix-1.
- Nothing succeeds like success. It's important that you know how to motivate your students properly. Reinforcing their successes is a must. Read about how to do this in the article titled: *The CFI's Golden Rule* in Appendix-1.
- Since slow flight is such an important skill for a student to develop, you should know just how important it is. To find out, read the following article: *Stick and Rudder Evaluation* Tool in Appendix-1.
- Mastering stabilized "variable rate" descents is an essential skill if a student is to learn to land quickly. Learn more about this technique by reading, *Variable Rate Descents* in Appendix-1.
- At the end of this lesson, your student should have the skill necessary to immediately establish a trimmed, power-off descent at an attitude for 1.4 Vs and 1.3 Vs. This is an essential skill to have.

Note: Minimum Controllable Airspeed (MCA)

Flight at MCA is no longer tested by the FAA on the private or commercial checkride. Slow flight at speeds 5-10 knots above stall speed without stall horn activation is now required. I recommend you still TEACH flight at MCA, regardless. Read "Not So Slow" in Appendix-1.

Next Lesson Homework

Rod Machado's How to Fly Handbook
Chapter 5 – Pages 1-17, *Stalls and Spins*
Chapter *7 – Pages 1-24, Ground Reference Maneuvers*
Chapter *13 – Pages 1-13, Performance Maneuvers*
Rod Machado's Private Pilot Handbook
Chapter 5 - Pages E18-36, *Flight Instruments*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.

Microsoft Flight Simulator
Private Pilot Lessons:
Lesson 2: *Steep turns*

Completion Standards: By the end of this lesson, the student should have the fundamental skills necessary to fly a traffic pattern and maintain a constant attitude and airspeed on final approach. The student should also have a more thorough understanding of operating in the slow-flight regime at MCA without stalling the airplane. The introduction to flying a rectangular pattern gives the student his/her first insight to how wind affects the airplane in flight. At this point, the instructor will definitely see strong habit formation of rudder and aileron coordination during coordination rolls.

LESSON 4. DUAL FLIGHT (Ground 1.2/Flight 1.3)

Objective: During this lesson, the student should achieve the ability to recognize and recover smoothly from stalls without direction from the instructor, fly prescribed patterns by ground references, and execute a traffic pattern and landing approach with the instructor's direction. The student should also develop a basic understanding of emergency landing procedures and the relationship between glide speed and glide distance.

1. Preflight discussion
    a. Review homework
    b. Introduce concept of situational awareness
2. Takeoff, traffic pattern, and departure – Do
3. Straight and level flight, turns, climbs, and descents. – Do
4. Coordination rolls – Do
    a. During descents on a specific heading – Do
5. Slow flight at MCA – Do
    a. Entering and exiting slow flight
    b.Turns during slow flight at MCA
    c. Descents at slow flight at MCA
    d. Leveling off from descents at MCA
6. Power-on stalls – Demo/Do
    a. Partial power stalls (introduction) – Demo/Do
    b. Full power stalls – Demo/Do
7. Constant airspeed variable rate descents – Do
    a. While maintaining constant heading
8. Simulated go-arounds from approach speed with full flaps
9. Steep turns (45°) – Do
10. Elementary forced landing simulation – Do
    a. Glide distance vs. airspeed change
    b. Forward slip introduction – Demo/Do
    c. Go around procedures – Demo/Do
11. Ground reference maneuvers
    a. Crabbing – Demo/Do
    b. Ground speed change with wind – Demo
    c. Rectangular course – Demo/Do
    d. Turns around a point – Demo/Do
    e. S-turns across a road. – Demo/Do
12. Traffic pattern and landing approach – Do
13. Postflight discussion
14. Preview of next lesson
    a. Takeoffs and landings
    b. Emergency procedures
    c. Stabilized approaches
    d. Assign homework

Lesson Philosophy

- At this point in the student's training and later on as well, you should make your stall training a bit more realistic. I'm speaking of a technique that will help your student understand what it's like to find him- or herself in stall while not expecting it. Read the article: *Stall Simulation* in Appendix-1.
- The reason some students do well in training then fail in real life situations is because of something known as *State Dependent Learning*. Read the article under that title in Appendix-1.
- I do hope that you'll occasionally cover the airspeed indicator during training to help your student develop his/her attitude flying skills.
- Keep in mind that many of the flight maneuvers we teach have a deeper value to them that's often not apparent by the maneuver's name. Read the article titled, *Reveal the Hidden Value* in Appendix-1 to learn more about this.
- "Oops! I forgot." Ever hear a student say that? Well, here's how you can help your student better remember what they're experiencing during each lesson. Read the article titled, *Audio Recorders – A Student's Best Friend* in Appendix-1.
- Is your student having trouble maintaining altitude during ground reference maneuvers? If so, you'll want to mention the idea about proper scanning during these maneuvers. Please read the Q&A titled, *Dividing Attention* in Appendix-1.
- As a final note on this lesson, you'll notice that I'm a big fan of using Microsoft Flight Simulator to enhance training in these lesson plans. Read the article, *The Power of Simulators* in Appendix-1 to learn why.

Next Lesson Homework

Rod Machado's How to Fly Handbook
Chapter 5 – Pages 17-56, Stalls and Spins
Chapter *7 – Pages 1-24, Ground Reference Maneuvers*
Rod Machado's Private Pilot Handbook
Chapter 6 - Pages F20-52, *FARs*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.
Rod Machado's Plane Talk
Chapter 10, *Surviving the Learning Plateau*, Page-195

Microsoft Flight Simulator
Student Pilot Lessons:
Practice what you've learned

Completion Standards: By the end of this lesson, the student will have the basic skills to recognize and recover from power-off and power-on stalls and correct for the effects of wind on the flight of an airplane. The student should also have developed the basic habits required to successfully troubleshoot engine problems as well select a suitable emergency landing site, approach that site and land the airplane in the event of a complete engine failure.

LESSON 5. DUAL FLIGHT (Ground 1.2/Flight 1.3)

Objective: This lesson is a review of the flight maneuvers and procedures already covered in preparation for serious work on takeoffs and landings, and traffic pattern operations. Reasonable proficiency in all coordination, airspeed control, trimming and ground reference maneuvers (shown below) should be achieved before takeoff and landing practice is initiated. The initial introduction to "spin recognition and awareness" should establish the fundamental habit pattern of using rudder to stop the rotation experienced during spin entry (and not the use of aileron to lift a falling wing). By the end of this lesson, there should be no doubt that the student can establish a stabilized and trimmed power-on/off flight condition that simulates airplane operations on the downwind, base, and final approach. Time available at the end of this lesson can be used for a few touch and go landings.

1. Preflight operations
   a. Review homework
2. Crosswind takeoff control placement – Do
3. Slow flight and power on/off stalls – Do
4. Stabilized flight condition for (simulated) pattern operations – Demo/Do
   a. Downwind – no flaps/1.5 Vs
   b. Downwind – 10°-15° flaps/1.5 Vs
   c. Base leg - 10°-15° flaps/1.4 Vs
   d. Final approach - 10°-20° flaps/1.3 Vs
5. Spin awareness – Demo/Do
   a. Cross–control stalls – Demo/Do
   b. Use of rudder to stop entry rotation – Demo/Do
   c. Falling leaf stall practice – Demo/Do
   d. Actual 1-turn spin entry/recovery if possible – Demo/Do
6. Ground reference maneuvers – Do
   a. Rectangular course – Do
   b. Turns about a point – Do
   c. S–Turns – Do
7. Emergency forced landing simulation – Do
   a. Forward slip practice – Do
8. Traffic pattern observance, entry, and departure – Do
9. T&G Takeoffs and landing – Do/Instructor supervision
10. Postflight discussion
11. Preview of next lesson
   a. Takeoffs and landings
   b. Landing crosswind correction
   c. Balked takeoffs and go–arounds
   d. Assign Homework

Lesson Philosophy

- How good are your aviation explanations? Read the article, *A Mind Altering Experience* in Appendix-1 to learn how you might improve them.
- Teaching involves more than talking, as you well know. It's your ability to help the student make connections between items, ideas, and concepts that helps accelerate learning. Learn more about this by reading the article titled, *Perceptual Magic* in Appendix-1.
- Here's an article I want you to read before the next lesson on landings. This article is perhaps one of the most important ones in helping a student guide his or her own behavior. Read the article titled, *Self-Talk Dialogues* in Appendix-1.

Next Lesson Homework

Rod Machado's How to Fly Handbook
Chapter 6, Pages 1-24, Takeoffs and Climbs
Chapter 8, Pages 1-20, Flying a Traffic Pattern
Chapter 9, Pages 1-10, Approaching to Land
Rod Machado's Private Pilot Handbook
Chapter 7 - Pages G1-29, *Airport Operations*
Chapter 8 - Pages H1-11, *Radio Operations*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.
Rod Machado's Plane Talk
Chapter 2, *The Truth About Good pilots,* Pg-17

Microsoft Flight Simulator

Student Pilot Lessons:
Lesson 6: *Landings*
Private Pilot Lessons:
Lesson 4: *The Traffic Pattern*

Completion Standards: By the end of this lesson the student should be ready to begin takeoff and landing practice. The student should be capable of establishing the airplane in any attitude at any airspeed and at any descent rate and trim for that flight condition. The habit of using rudder to stop spin entry rotation and elevator to decrease the angle of attack should be evident and becoming stronger at this stage of training. There should be no doubt that the student can identify when the airplane is drifting due to wind and be able to immediately correct that drift by crabbing into the wind.

LESSON 6. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Takeoff and Landing Practice

Objective: This lesson consists of concentrated practice of takeoffs and landings. By the end of this lesson, the student should be able to make "directed" takeoffs and landings without assistance with the controls.

1. Preflight discussion – Instruction and review
   a. Review homework
   b.Weight and balance calculation
2. Takeoffs and landings – Directed practice
   a. Normal takeoff and landing – Do
   b. Use touch and goes if runway permits
   c. Use power-off approaches initially
   d. Use partial flaps initially
   e. Recognizing when to abort the takeoff
   f. Recognizing when to abort the landing
   g. Forward slips to landing – Do
   h. Stabilized approach concept – Do
   i. Sterile cockpit – takeoff and landing – Do
3. Traffic pattern operations – Do
4. Visual approach aids (VASI, PAPI, etc.)
5. Wake turbulence: precautions and avoidance – Do
6. Postflight discussion
7. Preview of next lesson
   a. Crosswind takeoffs and landings
   b. Balked takeoff and landing recoveries
   c. Go-arounds
   d. Assign homework

Lesson Philosophy

- If you've read Chapter 9 of my *How to Fly an Airplane Handbook*, you'll know I favor having the student make power-off approaches during the first lesson on landings. The reason is that I want the students to develop their "glide length" judgment. I also want the student to have a descent profile that doesn't change (as it does when power is reduced) as the airplane crosses the runway threshold and prepares to roundout and flare for landing. If possible, pick the spot on downwind or base leg where the student can reduce power to idle and glide to the runway. Get the student to make the guess as to when to bring back power and correct this if the student guesses wrong.
- If your student has learned the basics well, then he or she will turn base, reduce power (at some point), pitch the airplane to the proper attitude for 1.4 Vs and trim for that condition. The more skilled they are at doing this, the quicker they'll learn how to land an airplane.
- Keep in mind that it's easy to distract a student during landing practice. Sometimes CFIs talk way too much. How much? Read the article: *Talk, Talk and More Talk* in Appendix-1 to find out.
- Sometimes you can actually be too helpful to your student during training and decrease that student's learning ability. Read the article titled: *Too Much Help* in Appendix-1 to see how this might happen.
- If there's one often overlooked skill in the traffic pattern that every student and pilot needs, it's the skill of looking for traffic. Read the article, *Stop, Look and Turn* in Appendix-1 to learn more about this.
- Now here's a technique that most instructors don't use to help their student learn to flare an airplane. Read the article, *Trying Something New* in Appendix-1 to learn about it.

Next Lesson Homework

Rod Machado's How to Fly Handbook
Chapter 8, Pages 20-26, Flying a Traffic Pattern
Chapter 9, Pages 10-30, Approaching to Land
Chapter *10, Pages 1-12, The Roundout and Flare*
Chapter *11, Pages 1-9, Crosswinds and Slips*
Rod Machado's Private Pilot Handbook
Chapter 8 - Pages H11-22, *Radio Operations*
Chapter 9 - Pages I1-13, *Airspace*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.
Airmen Certification Standards
Read, *IV-Takeoffs, Landings, Go-Arounds:* M, N

Microsoft Flight Simulator
Student Pilot Lessons:
Lesson 6: *Landings*

Completion Standards: By the end of this lesson, the student should be able to recognize the desired glidepath needed to reach the runway safely as well as properly modify that glidepath through the use of pitch and power. The student should also have a basic idea of the behavioral elements involved in rounding-out and flaring the airplane for landing.

LESSON 7. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Takeoff and Landing Practice

Objective: Takeoffs and landing practice should continue with this lesson. If feasible, basic crabbing to landing should be introduced in this session with a "kick out" procedure initiated prior to touchdown. By the end of this lesson, the student should be able to make directed takeoffs and landings without assistance on the controls. Simulated forced landings should be introduced at unannounced intervals during this lesson, and hereafter.

1. Preflight discussion – Instruction and review
    a. Review homework
    b. Takeoff/landing performance chart calculation
    c. Density altitude
    d. Crosswind component chart calculation
2. Takeoffs and landings – Directed practice
    a. Density altitude simulation – Demo/Do
    b. Evaluating runway trapezoidal geometry – Demo/Do
    c. Correcting for a low approach – Do
    d. Correcting for a high approach – Do
3. Crosswind takeoff correction (crabbing) – Do
4. Crab crosswind landings (crabbing) – Do
5. Simulated engine failure in pattern – Do
6. Use of partial and full flaps – Do
7. Go around procedures with partial and full flaps – Do
8. Basic takeoff procedure – Do
    a. Aborting takeoff while on ground – Demo/Do
9. Balked landing procedures – Demo/Do
    a. Bounce recovery – Demo/Do
    b. Floating recovery – Demo/Do
10. Wake turbulence: precautions and avoidance – Do
11. Postflight discussion
12. Preview of next lesson
    a. Slips (forward and side slipping)
    b. Crosswind landing correction (side slip)
    c. Advanced balked takeoffs and go-arounds
    d. Preparation for pre-solo written exam
    e. Assign homework

Lesson Philosophy

- When it comes to teaching landings, sometimes you have to get creative to help the student get the idea about *when* to roundout and *how* to flare. This is where flight simulators can be a valuable aid in developing this skill. Read the article titled, *Simulators for Flare Training* in Appendix-1 to learn more about this concept.
- How important is having good coordination skills when teaching a student to land? Very important! Read about the necessity of this skill and ways to enhance it in the article, *The Runway Alignment Reflex* in Appendix-1.
- Now here's an idea that you won't find in your typical flight school. It's a technique that was once used by individuals to teach themselves to fly without the aid of a flight instructor. I'm sharing it with you because you might find elements of this technique very useful. Read, *The Eastman Technique* in Appendix-1 to learn more.
- Sometimes you'll find that older students don't learn to land as quickly as younger ones. This has nothing to do with their reflex as much as it has to do with their eyesight. Read, *Older Students and Landing Troubles* in Appendix-1 to learn more.

Next Lesson Homework

Rod Machado's How to Fly Handbook
Chapter *10, Pages 12-36, The Roundout and Flare*
Chapter *11, Pages 9-20, Crosswinds and Slips*
Read Emergency Section of your POH
Rod Machado's Plane Talk
Chapter 5, Complete
Microsoft Flight Simulator
Student Pilot Lessons:
Lesson 6: *Landings*

Completion Standards: By the end of this lesson, the student should be able to make the takeoff, fly the traffic pattern, stabilize and trim the airplane on final approach and land (under normal conditions) without the instructor physically touching the controls.

LESSON 8. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Takeoff and Landing Practice

Objective: Crosswind takeoffs and landings, as well as side slips to landing, should be added to the practice of normal takeoffs and landings. Typical pattern emergencies should be introduced and practiced here (i.e., flap retraction failure, rough engine condition, carb ice detection and removal, stuck throttle, airspeed indicator failure, etc.) . On completion of this lesson, the student should be able to make unassisted takeoffs and landings, and fly an accurate traffic pattern.

1. Preflight discussion – Instruction and review
    a. Review homework
    b. Minimum equipment list review
    c. Issue pre-solo written exam and review
2. Takeoffs and landings – Do
3. Engine failure on takeoff simulation – Demo/Do
4. Emergency pattern descent and landing – Demo/Do
5. Pattern emergencies
    a. Door/window pop open on takeoff – Demo/Do
    b. Flap retraction failure – Demo/Do
    c. Rough engine condition – Demo/Do
    d. Carb ice detection and removal – Demo/Do
    e. Stuck throttle – Demo/Do
    f. Elevator control failure – Demo/Do
    g. Airspeed indicator failure – Demo/Do
6. System and equipment malfunction – Do
7. Crosswind takeoffs and landings – Do
8. Slips (forward and side) – Do
9. Use of flaps for takeoffs – Do
10. Landing without use of airspeed indicator – Do
11. Loss of radio procedures – tower light-gun demo
12. Balked takeoffs
    a. Aborting takeoff while airborne – Demo/Do
13. Balked landing
    a. Porpoise correction – Demo/Do
    b. Ballooning correction – Demo/Do
14. Emergency go-arounds – Do
15. Wake turbulence: precautions and avoidance – Do
16. Postflight discussion
17. Preview of next lesson
    a. Increased precision with takeoffs and landings
    b. Assign homework

Lesson Philosophy

- Expecting to go around is one thing, but when a go-around is required when the student least expects it, that's another matter. Read the article, *Teaching Go-arounds* in Appendix-1 to learn more about making this maneuver more realistic for your students.
- Solo flight is coming up for your student and you should better understand your natural reaction to letting your student fly the airplane alone. Read the article, *Let Them Leave the Nest* in Appendix-1 to learn more about this concept.
- Almost every instructor wants to produce the best pilot possible. The problem is that sometimes the instructor wants to do more than is actually necessary to do to make a pilot safe. Read, *Measure With The Right Ruler* in Appendix-1 to learn why you might be making unreasonable demands on your student.
- While soloing a student too soon can present a big problem, so can delaying a student's solo. To learn why, please read, *Delaying Solo* in Appendix-1.

Next Lesson Homework

Rod Machado's Private Pilot Handbook
Chapter 10 - Pages J1-14, *Aviation Maps*
Chapter 9 - Pages I14-36, *Airspace*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.
Rod Machado's Plane Talk
Chapter 5, *Situational Awareness,* Page 83
Microsoft Flight Simulator
Student Pilot Lessons:
Lesson 6: *Landings*

Completion Standards: By the end of this lesson, the student should be able to consistently and safely make acceptable takeoffs and landings. The student should be aware of how to avoid the hazards associated with takeoffs and landings, including wake turbulence avoidance, crosswind takeoffs and landings, and pattern emergencies. This lesson can be repeated until the student attains the behavioral objectives listed above.

LESSON 9. DUAL AND FIRST SOLO FLIGHT (Ground 1.2/Flight 1.3) – First Solo

Objective: At the completion of the dual portion of this lesson, the student should have achieved reasonable proficiency in making consistently safe takeoffs and landings without assistance in both normal and (light) crosswind conditions. He should be able to recover from poor approaches, bounces, floating and porpoises. He should have demonstrated the ability to solve all ordinary problems usually encountered during pattern operations. Three solo flights are recommended during the first solo period to build the student's confidence, if that student is indeed ready to solo. No further solo flights should be authorized until after a rest period and further dual review of basic maneuvers.

1.Preflight discussion – Instruction and review
   a. Review homework
   b. Student document check in prep for solo
2.Takeoffs and landings – Do
3. Engine failure on takeoff simulation – Do
4. Pattern emergencies - review
5. Slips (forward and side) review – Do
6. Landing without use of airspeed indicator – Do
7. Balked takeoffs review – Do
8. Balked landing review – Do
9. Wake turbulence: precautions and avoidance review – Do
10. Solo – if student is ready
11. Postflight discussion
12. Preview of next lesson
   a. Basic airwork review of primary maneuvers – Do
   b. Assign homework

Lesson Philosophy

- How do you know when your student is ready for solo? Read, *When is a Student Ready for Solo*? in Appendix-1 to find out.
- Be sure to do all the required paperwork necessary to solo your student. This includes the following:
  - ✓Complete pre-solo written exam.
  - ✓Endorse student pilot certificate for solo in make and model of airplane.
  - ✓Pre-solo aeronautical knowledge endorsement as per FAR 61.87(b).
  - ✓Pre-solo flight training endorsement as per FAR 61.87(c).
  - ✓90-day solo endorsement as per FAR 61.87(p).
- What does it mean to properly supervise a student in solo flight? Care to find out? Read, *Supervising Our Students* in Appendix-1.

Next Lesson Homework

Rod Machado's Private Pilot Handbook
Chapter 12 - Pages L1-24, *Weather Theory*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.
Rod Machado's Plane Talk
Chapter 5, Read remainder of chapter.
Airmen Certification Standards
Read, *I-Preflight Preparation:* A and B

Microsoft Flight Simulator
Student Pilot Lessons:
Practice what you've learned: Free flight

Completion Standards: At the end of this lesson, the instructor will assess whether the student is capable of making three solo landings. The ability to perform all pattern operations without assistance from the instructor, along with performance that is "consistent," is essential for evaluating a student's readiness for solo. The solo should be directly supervised by the instructor with the instructor clearly visible to the student somewhere on the field (preferably near the runway, if possible).

LESSON 10. DUAL AND SECOND SOLO FLIGHT (Ground 1.2/Flight 1.3) – Review and Second Solo

Objective: At the completion of the dual portion of this lesson, the student will have reviewed all the basic pre-solo maneuvers with the introduction and practice of accelerated stalls and cross control stalls. Progressively higher standards of performance should be required for all maneuvers previously learned. The student should have achieved reasonable proficiency in "all" these maneuvers before returning to the airport to solo again. The student should be reintroduced to the practice area with emphasis on exiting and returning to the traffic pattern.

1. Preflight discussion – Instruction and review
   a. Review homework
2. Review of pre-solo maneuvers
   a. Slow flight – Do
   b. Power-off and on stalls – Do
   c. Spin awareness (entry/recovery if possible)
   d. Steep turns – Do
   e. Coordination rolls – Do
   f. Emergency landing – Do
   g. S–turn across a road – Do
   h. Turns about a point – Do
2. Cross–control stalls – Demo/Do
3. Accelerated stalls – Demo/Do
4. Dealing with distractions in flight – Demo/Do
   a. Create distractions during flight – Demo/Do
   b. Task management – Demo/Do
5. Emergency forced landing simulation – Do
6. Takeoffs and landings – Do
7. Remaining time spent in solo flight – Instructor observes
8. Postflight discussion
9. Preview of next lesson
   a. Maximum performance takeoffs and landings
   b. Assign homework

Lesson Philosophy

- Now that you've successfully soloed your student, you might want to consider how to handle those students who want to do a little more with the airplane than you might actually feel comfortable with them doing. Read the article titled, *Developing Standards* in Appendix-1 to learn more about this.
- Before your students are allowed to fly solo on their own in the pattern or in the local practice area you'll want to make sure they know what's expected of them. To ensure this, you'll list your personal requirements for solo in their logbook that they must meet before soloing an airplane. You can find these requirements on Page F-14 of my Private Pilot Handbook. I've listed a few of my own requirements below. Please list your own:

Rod's Requirements for solo flight:

1. Student must notify CFI at least 24 hours before any solo flight.
2. Solo flight to be conducted only in flying club's airplanes.
3. No solo flight if 90 degree crosswind component exceeds 7 knots (based on x-wind chart placed at end of this logbook).
4. No solo flight between sunset and sunrise.
5. No solo flight if wind gusts exceed 15 knots.
6. No solo flight if visibility is less than 5 miles.
7. Airplane will have full fuel tanks before every solo flight.
8. No solo flight unless student has obtained an abbreviated weather briefing (even for pattern work). (800) WX-BRIEF
9. Student must follow additional requirements listed at the back of this logbook pertaining to X-C flying, night flight, practice area, etc.

- Since we live in a digital age, there's no reason the student can't contact you via cell phone one hour prior to soloing if you so desire. For that matter, you might even require him to send you a photo of the airport's wind sock to ensure that the current winds don't exceed your set limitations for solo. You're the instructor and you set the limitations. So set them.

Next Lesson Homework

Rod Machado's How to Fly Handbook
Chapter 6, Pages 25-37, Takeoffs and Climbs
Chapter *12, The Roundout and Flare*
Airmen Certification Standards
Read, *I-Preflight Preparation:* G and H
Read, *IV-Takeoffs, Landings, Go-arounds:* C, D, E, F
Microsoft Flight Simulator
Student Pilot Lessons:
Practice what you've learned: Free flight

Completion Standards: At the end of this lesson, the student should be allows to solo assuming a satisfactory review of the listed pre-solo airwork. Once again, the solo should be directly supervised by the instructor with the instructor clearly visible to the student somewhere on the field (preferably near the runway).

LESSON 11. DUAL AND THIRD SOLO FLIGHT (Ground 1.2/Flight 1.3) – Review and Third Solo

Objective: The introduction "of" and instruction "in" additional maneuvers and procedures should continue after the second solo flight. Initial takeoff and landing practice for this lesson should consist of an introduction to maximum performance takeoff and landing techniques. Four or five solo flights in the traffic pattern should be permitted, depending on the student's performance. Depending on student performance, the student should be allowed to perform unsupervised solo takeoff and landings (no exiting the pattern) under the limitations the instructor had stated in the student's logbook (one of those limitations requires students to notify and obtain permission of the instructor for each solo flight).

1. Preflight discussion
    a. Review homework
    b. Takeoff and landing performance calculations
2. Windshear recognition and recovery – Demo/Do
3. Dealing with distractions in pattern – Demo/Do
    a. Create distractions for student – Demo/Do
4. Maximum performance takeoff
    a. Short field takeoff – Demo/Do
    b. Soft field takeoff – Demo/Do
    c. Taxi technique for soft field takeoff – Demo/Do
5. Maximum performance landings
    a. Runway overflight demo – Demo/Do
    b. Short field landing – Demo/Do
    c. Soft field landing – Demo/Do
6. Postflight discussion
7. Preview of next lesson
    a. Practice area checkout
    b. Assign homework

Lesson Philosophy

- It's very important to keep in mind that the purpose of solo isn't to give the flight instructor a rest. It's intended to increase the student's confidence. No, it's not intended to give the student a breather from the intensive pre-solo training experienced up to this point. The student is in your charge to learn how to fly so solo is an absolute necessity to increase his confidence and inspire/equip him or her to learn more.
- There's no reason the student can't and shouldn't fly solo in the pattern to practice takeoffs and landings, as long as that student does so under the limitations you've stated in his/her logbook.
- What you don't want the student to do is to feel that he's flying solo just to fly—for fun. You want to impress upon the student that each solo flight should begin with a stated "learning" goal and end with an evaluation of progress toward that goal. This is where it's very important for you to debrief your student after every solo flight. Yes, that means a phone call or a message that checks his or her progress after each solo flight. This is what it means when we say that the solo is "supervised."

Next Lesson Homework

Rod Machado's Private Pilot Handbook
Chapter 12 - Pages L25-58, *Weather Theory*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.
Rod Machado's Plane Talk
Chapter 10, *Sin Qua Non,* Page 193
Airmen Certification Standards
Read, *II-Preflight Procedures:* A through F
Read, *IV-Takeoffs, Landings, Go-arounds:* A and B
Read, *III-Airport Operations:* A and B

Microsoft Flight Simulator

Student Pilot Lessons:
Practice what you've learned: Free flight

Completion Standards: At the completion of this lesson, the student will have a basic understanding (not much skill at this point) of maximum performance takeoffs and landings. Students will also be made aware of the dangerous effects of distractions during pattern operations as well as how to recognize and avoid these distractions. The solo performed during this lesson should, once again, be directly supervised by the instructor with the instructor clearly visible to the student somewhere on the field (preferably near the runway).

LESSON 12. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Review All Basic Pre–solo Maneuvers

Objective: This lesson consists of a short trip, using pilotage, to navigate to and from the practice area. The intent is to prepare the student for solo flight to and from this area as well as review of the proper method to enter the local traffic pattern. A quick introduction to basic instrument flying occurs near the end of the lesson. At the completion of the lesson the student should be ready for local solo flights in assigned practice areas.

1.Preflight discussion – Instruction and review
   a. Review homework
   b. Sectional chart review of practice area – Do
   c. Pilotage to/from practice area – Do
   d. Area Checkout
2. Review of pre-solo maneuvers – Do
3. Slow flight – Do
4. Power-off and on stalls – Do
5. Cross–control stalls – Do
6. Spin awareness training (entry/recovery if possible) – Do/Demo
7. Steep turns – Do
8. Coordination rolls – Do
9. Accelerated Stalls – Demo/Do
10. Recovery from unusual attitudes – Do/Demo
11. Brief introduction to basic instrument flight
   a. Straight and level flight – (instrument reference only - Demo/Do)
   b. Turns – (instrument reference only - Demo/Do)
   c. Emergency 180° turn on instruments – (instrument reference only - Demo/Do)
   d. Climbs – (instrument reference only - Demo/Do)
   e. Descents – (instrument reference only - Demo/Do)
12. Re-familiarization with practice area – Do
13. Radar vectoring navigation from ATC
14. Emergency landing – Do
15. S–turn across a road – Do
16. Turns about a point – Do
17.Takeoffs and landings – Do
18. Remaining time spent in solo flight – Instructor observes
19. Postflight discussion
20. Preview of next lesson
   a. First solo flight outside traffic pattern
   b. Assign homework
   c. Assign solo practice maneuvers

Lesson Philosophy

- The brief introduction to instrument flying in this lesson is to give the student the very basic skill of exiting a cloud safely should he or she fly into one. The reason for this introduction is that the student might be allowed to fly solo to the practice area on subsequent flights. Once again, the reason for flights to the practice area is to build confidence, *not to promote* recreational flying (that comes after earning the private pilot certificate).
- To help you introduce instrument scanning to your student, please read the article titled, *A Scan Plan* in Appendix-1.

Next Lesson Homework

Rod Machado's Private Pilot Handbook
Chapter 13 - Pages M1-38, *Wx Charts/Briefings*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.
Rod Machado's Plane Talk
Chapter 10, *Art of Making Mistakes,* Page 199
Airmen Certification Standards
Read, *III-Airport Operations:* A and B
Read, *VIII-Basic Instrument Maneuvers:* A, B, C, D
Read, *IX-Emergency Operations*: A, B, C

Microsoft Flight Simulator

Instrument Pilot Lessons: Overview
Read: *Scanning the Instruments*
Simulator: Self-practice flying on instruments

Completion Standards: By the end of this lesson the instructor should feel confident that the student has a sufficient grasp to safely perform all the previously studied pre-solo maneuvers as well as an ability to navigate to and from the practice area and handle any appropriate radio communications. The short introduction to instrument flight should give the student the necessary skill to exit a cloud should that unfortunate occurrence happen during a trip to the practice area. If the instructor permits, the student should be allowed to perform unsupervised solo trips to and from the practice area as well as operations in the traffic pattern based on the limitations the instructor had stated in the student's logbook (one of those limitations requires students to notify and obtain permission of the instructor for each solo flight).

LESSON 13. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Instruments Basic Skills

Objective: This lesson's objective is to provide the student with additional practice at flying by reference to instruments. The student should be allowed to experience vertigo as induced by the instructor.

1. Preflight discussion – Instruction and review.
    a. Review homework
2. Instrument flight to practice area:
    a. Climbs – (instrument reference only) – Do
    b. Straight and level – (instrument reference only) – Do
    c. Descents – (instrument reference only) – Do
    d. Slow flight – (instrument reference only) – Do
3. Turns to a heading – (instrument reference only) – Do
    a) Using the magnetic compass
4. Induced vertigo by instructor – Demo
5. Unusual attitudes – (instrument reference only) – Demo/Do
6. Graveyard spiral – (instrument reference only) – Demo/Do
7. Postflight discussion
8. Preview of next lesson
    a. Assignment homework
    b. Basic VOR/GPS navigation

Lesson Philosophy

- At this point I would encourage you to let your student fly to the practice area and practice the maneuvers you assign. He or she should do that at least two or three times before starting their cross country training. Nothing builds confidence better than being given the responsibility to fly solo to and from the practice area.
- It's now time to help your student build those instrument flying skills. If you have a simulator at your flight school, then it might be wise to add an entire simulator lesson on instrument flying here before actually conducting **Lesson 13**. Simulators help develop instrument scanning skills quickly compared to doing the same training in an airplane. Please have your student make use of his or her Microsoft Flight Simulator in practicing these skills at home, too.
- Would you like to learn a unique and almost guaranteed way to induce vertigo in your student when he or she is under the hood? Read the article titled, *Vertigo* in Appendix-1 to learn how. Remember, you're not inducing vertigo to entertain yourself. Instead, you're doing it so that the student can better react the first time he or she experiences it on his/her own.

Next Lesson Homework

Rod Machado's Private Pilot Handbook
Chapter 15 - Pages O1-26, *Performance Charts*
Chapter 16 - Pages P1-9, *Weight and Balance*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.
Rod Machado's Plane Talk
Chapter 12, *The Don't Panic Button,* Page 275
Review: Rod Machado's *Instrument Skills for the Private Pilot* eLearning Course

Microsoft Flight Simulator

Instrument Pilot Lessons: Overview
Study: *Scanning the Instruments*
Simulator: Self-practice flying on instruments

Completion Standards: At the end of this lesson, the student should be able to perform the four fundamentals of flight completely by reference to instruments. The student should also have the ability to identify and recover from unusual attitudes and graveyard spirals during flight solely on instruments.

LESSON 14. SOLO FLIGHT (Flight 1.3) – Practice Area Solo Flight
Objective: This is the first lesson during which the student is permitted to fly solo to and from the practice area under the limitations specified by the instructor in the student's logbook. This should include the practice of specified maneuvers and procedures within assigned practice areas, and normal takeoffs and landings upon returning to the home airport.*

1. Flight maneuvers and procedures – Solo practice, as assigned
2. Takeoffs and landings – Solo practice
3. Preview of next lesson
    a. Review of basic instrument skills

*The student may fly solo to and from the practice area and practice touch and goes as the instructor permits here and without having the instructor nearby to supervise this activity. The solo is done only under the instructor's stated stipulations and requirements listed in that student's logbook and agree to by the student (by signature).

Next Lesson Homework

Rod Machado's Private Pilot Handbook
Chapter 16 - Pages P9-20, *Weight and Balance*
Chapter 17 - Pages Q1-21, *Pilot Potpourri*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.
Rod Machado's Plane Talk
Chapter 10, *Thanks for the Memories,* Page 229
Airmen Certification Standards
Read, *VIII-Basic Instrument Maneuvers:* E
Microsoft Flight Simulator
Student Pilot Lessons:
Practice what you've learned: Free flight

Completion Standards: At the completion of this solo flight, the student should have confidence and a sense of ease in flight which will make him or her receptive to new areas of instruction.

LESSON 15. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Instruments Basic Skills

Objective: This lesson's objective is to provide the student with additional practice at flying by reference to instruments. The student should be allowed to experience vertigo as induced by the instructor.

1 Preflight discussion – Instruction and review.
   a. Review homework
2. Instrument flight to practice area:
   a. Climbs – (instrument reference only) – Do
   b. Straight and level – (instrument reference only) – Do
   c. Descents – (instrument reference only) – Do
   d. Slow flight – (instrument reference only) – Do
3. Turns to a heading – (instrument reference only) – Do
   a) Using the magnetic compass
4. Induced vertigo by instructor – Demo
5. Unusual attitudes – (instrument reference only) – Demo/Do
6. Graveyard spiral – (instrument reference only) – Demo/Do
7. Postflight discussion
8. Preview of next lesson
   a. Assign homework
   b. Basic VOR/GPS navigation

Lesson Philosophy

- The graveyard spiral (aptly named) is an important concept for your student to understand here. When the airplane is in a spin, the airspeed typically stabilizes at some relatively low value. In a graveyard spiral – which is nothing like a spin but is often confused with a spin—the airspeed increases. Here's how to demonstrate the typical entry into the spiral.
  1. Slow the airplane to 1.4 Vs in a no-flap condition.
  2. Trim the airplane for level flight at this speed.
  3. Now allow the airplane to bank right or left as if the pilot was on approach at night and not paying attention to flying the airplane.
  4. As the airplane begins picking up speed, the bank will tighten and the nose will pitch up perpendicular to the airplane's lateral axis.
  5. The bank will increase as a result, which further pitches the nose up.
  6. Ultimately, the student instinctually pushes forward on the elevator control which increases the speed and causes the airplane to pitch up further. Very bad news.
  7. This is why recovering from the graveyard spiral involves reducing power then leveling the wings to initially stabilize the airplane, followed by raising the nose to reduce airspeed.

Next Lesson Homework

Rod Machado's Private Pilot Handbook
Chapter 11 - Pages K1-38, *Radio Navigation*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.
Rod Machado's Plane Talk
Chapter16, *Columbus Among Us,* Page 355
Airmen Certification Standards
Read, *VI-Navigation:* B

Microsoft Flight Simulator
Private Pilot Lessons:
Lesson 3: *VOR Navigation*

Completion Standards: At the end of this lesson, the student should be able to perform the four fundamentals of flight completely by reference to instruments. The student should also have the ability to identify and recover from unusual attitudes and graveyard spirals during flight solely on instruments.

LESSON 16. DUAL FLIGHT (Ground 1.2/Flight 1.3) – VOR/GPS Navigation

Objective: This lesson provides the student with an introduction to basic VOR and GPS navigation in preparation for the upcoming dual cross–country flight instruction.

1. Preflight discussion
   a. Review homework
   b. Introduction to VOR navigation
2. Introduction to Basic VOR navigation (visual reference only).
   a. Course selection – Do/Demo
   b. Tracking to then from a VOR station – Do/Demo
   c. Course tracking (wind correction) – Do/Demo
   d. Course interception – Do/Demo
   e. Cross radial reference to determine position – Do/Demo
3. Introduction to Basic GPS navigation
   a.Course selection – Do/Demo
   b. Flying direct to and from a waypoint – Do/Demo
   c. Tracking to and from a waypoint (wind correction) – Do/Demo
   d. Intercepting a bearing – Do/Demo
   e. Using the moving map to determine position – Do/Demo
4. Postflight discussion
5. Preview of next lesson
   a. Advanced VOR and GPS Nav (instrument reference only)
   b. Assign homework

Lesson Philosophy

- One of the nice things about Microsoft Flight Simulator is that it allows the student to practice VOR navigation on his or her own once some basic knowledge is acquired on this lesson.
- To assist you in teaching VOR concepts, here are two articles you might find useful. The first one is titled, *An Alternative VOR Explanation*. The next is titled, *VOR Navigation the Visual Way*. Both articles can be found in Appendix-1.
- Here's a great exercise for students to use in Microsoft Flight Simulator to develop their VOR navigation skills. Have the student go to "Map" mode in the flight simulator then leave the room as a family member clicks and drags the little black airplane icon to some location within 50 miles or so of the current airplane position (yes, the student might have to teach the family member how to do this, too). Then the student should reenter the room and, without looking at the map, return the simulator to the flying mode. Now the student uses VOR triangulation skills to determine his position on the sectional chart, then navigates back to the home airport.
- Make use of that desktop simulator! Even the Navy uses it in their ROTC program (to name just a few organizations) to help individuals learn how to fly.

Next Lesson Homework

Rod Machado's Private Pilot Handbook
Chapter 17 - Pages Q1-38, *Pilot Potpourri*
Rod Machado's Private Pilot Workbook
Answer corresponding questions.
Rod Machado's Plane Talk
Chapter 10, *Read remainder of chapter.*
Microsoft Flight Simulator
Student Pilot Lessons:
Practice what you've learned: Free flight

Completion Standards: At the end of this lesson, the student should be able to select any course to or from a station, intercept that course, and track it. The students should also be capable of determining his or her position by cross radial reference from two or more VOR stations. Depending on the type of GPS system available in the airplane, the student should develop the same fidelity with tracking a bearing to and from a waypoint as well as skill at using the GPS moving map display.

LESSON 17. SOLO FLIGHT (Flight 1.3) – Practice Area Solo Flight

Objective: This is the second lesson during which the student is permitted to fly solo to and from the practice area under the limitations specified by the instructor in the student's logbook. This should include the practice of specified maneuvers and procedures within assigned practice areas, and normal takeoffs and landings upon returning to the home airport.

1. Flight maneuvers and procedures – Solo practice, as assigned
2. Takeoffs and landings – Solo practice
3. Preview of next lesson
    a. Review of basic instrument skills
    b. VOR/GPS Navigation

Next Lesson Homework

Rod Machado's Private Pilot Handbook
Chapter 14 - Pages N1-46, *Flight Planning (or study* Rod Machado's *Cross Country Flight Planning eLearning Course*).
Rod Machado's Private Pilot Workbook
Answer corresponding questions.
Rod Machado's Plane Talk
Chapter 13 (All), Turbulence, Landings & Powerplants, Page 239
Airmen Certification Standards
Read, *VI-Navigation:* B

Microsoft Flight Simulator

Student Pilot Lessons:
Practice what you've learned: Fly to your local practice area and return in the simulator.

Completion Standards: At the completion of this solo flight, the student should have even more confidence and a greater sense of ease in flight which will make him or her receptive to new areas of instruction.

LESSON 18. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Basic Instruments and VOR Navigation

Objective: This lesson's objective is to provide the student with additional practice at flying by reference to instruments only and navigating by reference to VOR station and GPS waypoints (if the airplane is so equipped). This lesson prepares the student for the upcoming dual cross–country flight.

1. Preflight discussion
    a. Review homework
2. Instrument flight to practice area:
    a. Course selection – (instrument reference only) – Demo/Do
    b. Tracking TO then FROM a VOR station (instrument reference only) – Demo/Do
    c. Course tracking (wind correction) (instrument reference only) – Demo/Do
    d. Course interception (instrument reference only) – Demo/Do
    e. Cross radial reference to determine position (instrument reference only) – Demo/Do
    e. Climbs, turns, descents on instruments while navigating by VOR – Demo/Do
3. Postflight discussion.
4. Preview of next lesson
    a. Assign homework
    b. Procure materials for cross-country flight
    c. Plot and prepare cross–country flight log

Lesson Philosophy

- One of the things most flight instructors don't like to do is teach cross country flight techniques to students. So let me help you avoid doing this if it will make you happy. I've developed an eLearning course titled, *Cross Country Flight Planning for Beginners*. Visit the eLearning section of my web site at rodmachado.com and view the course specifics there.

Next Lesson Homework

Plan Assigned Cross-Country Flight

1. Draw route(s) on sectional/TAC chart
2. Pick checkpoints/plot course
3. Consult performance charts
4. Create initial flight log
5. Obtain NOTAMS, Wx Briefing
6. Consult Digital Chart Supplement (d-CS)
7. Morning of flight, use current winds for DR routes
8. Then calculate times, distances, fuel consumed
9. File flight plan

Rod Machado's Plane Talk

Chapter 16, *Ballerinas and Bullies*, Page 327

Airmen Certification Standards

Read, *VI-Navigation:* A, C, D

Read, *I-Preflight Preparation:* C, D, E, F, H

Microsoft Flight Simulator

Student Pilot Lessons:

Fly the cross-country flight you'll plan on next lesson. Assume no wind. Just fly the route. Examine the entire route on Google Earth, too.

Completion Standards: At the completion of this lesson the student should be able to navigate to and from a VOR and intercept courses solely when flying by reference to flight instruments.

LESSON 19. FIRST DUAL CROSS–COUNTRY FLIGHT (Ground 1.2/Flight 1.5) – Dual Cross-Country Flight

Objective: This lesson consists of a ground review of the cross-country flight log as per the homework assigned on the previous lesson. At the completion of this review, a short cross-country flight is made to a towered or non-towered airport. The emphasis on this flight will be navigation by dead reckoning, pilotage, and landfall along with radio communication with ATC facilities, as necessary. The diversion to a nearby airport can be either the towered or non-towered airport. A landing is made at both the original airport (towered/non-towered) and the diversion airport (towered/non-towered). (**Note: All XCs, dual and solo, are more than 50 nm from the original point of departure**.)

1.Preflight discussion
   a. Review homework
   b. Review cross-country flight planning
   c. Check weather, NOTAMS, etc.
   d. Emergency equipment for survival
   e. Filing a flight plan
2.Cross-country flying – Do
   a. Pilotage – Demo/Do
   b. Dead reckoning – Demo/Do
   c. Landfall navigation – Demo/Do
3. Cross–country emergencies
   a. Diverting to nearby airport – Do
   b. Simulated engine failures – Do
4. Unfamiliar airport procedures – Demo/Do
5. Non-tower airport procedures – Demo/Do
6. Class D (tower) airport procedures – Demo/Do
7. Use of basic radar service/flight following – Demo/Do
8. In-flight communications with flight service station – Do
9. Postflight discussion
10. Preview of next lesson
   a. Local solo practice flight
   b. Assign homework

Lesson Philosophy

- Having your student fly the selected cross country flight in Microsoft Flight Simulator prior to the actual flight is a great learning tool. Since this cross country lesson in primarily about dead reckoning, pilotage, and landfall navigation, have your students fly the route at home with a zero wind value in the simulator. This just makes it easier for them to create a flight log. The student should primarily be concerned with flying compass courses (no wind, remember), finding checkpoints and airports and recognizing landmarks. Microsoft Flight Simulator has some amazing scenic add-ons that create photo-realistic terrain. Have them fly it as if this were the real cross country flight. That means checking the weather, calculating the fuel consumed and so on. You might have to review their cross country planning a few days before the first dual cross country flight just to make sure they have the basic navigational numbers correct.
- Mechanical or electronic flight computer? Which one do you have your students use? I hope you said "mechanical" computer, such as the venerable E6-B. This is why I show students how to use this device in my *Private Pilot Handbook* and my *Cross Country eLearning Course*. The E6-B makes you smart because it requires that you have an idea about the "quantity" value you're looking for before you calculate it. Electronic flight computers don't make you smart. Yes, they make you efficient, but that's not making you smarter (i.e., exercise your brain). Perhaps one of the best things about the E6-B is that any wind calculation also produces a wind triangle (see my *Private Pilot Handbook*). What does that mean to your students? It means they can "see" how the wind affects the airplane. That's pure "educational" gold in my opinion.

Next Lesson Homework

Use Current Knowledge Test Guide to Prep for Exam
Take multiple practice exams in prep for knowledge exam
Rod Machado's Plane Talk
Chapter 16, *X-Wind Files*, Page 339
Airmen Certification Standards
Read, *V-Performance Maneuvers:* All
Read, *VII-Performance Maneuvers:* A, B

Microsoft Flight Simulator

Student Pilot Lessons:
Practice what you've learned: Re-fly the same flight you just flew with the instructor.

Completion Standards: At the completion of this lesson, the student will have a basic idea about how to plan, plot and fly a short cross-country flight to nearby towered and non-towered airports.

LESSON 20. SOLO FLIGHT (Flight 1.3) – Review Maneuvers and Navigation Practice
Objective: This lesson includes solo practice on flight maneuvers, takeoffs and landings, and on the use of VOR/GPS navigation.

1. Preflight discussion – Assignment of procedures and practice areas
    a. Slow flight
    b. Steep turns
    c. Power-off stalls (only)
    d. Coordination rolls
    e. VOR navigation (visually, of course)
    f. S-turns across a road
    g. Turns around a point
2. Takeoffs and landings – Solo practice
    a. Crosswind takeoffs and landings, slips
    b. Short and soft field takeoffs
    c. Short and soft field landings
3. Preview of next lesson
    a. Dual cross–country flight using radio aids

Next Lesson Homework

Plan Assigned Cross Country Flight

1. Draw route(s) on sectional/TAC chart
2. Pick checkpoints/plot course
3. Plot VOR course (TO/FROM) bearings (if used)
4. Consult performance charts
5. Create initial flight log
6. Obtain NOTAMS, Wx Briefing
7. Consult Digital Chart Supplement (d-CS)
8. Morning of flight, use current winds for DR routes
9. Then calculate times, distances, fuel consumed
10. File flight plan

Use Current Knowledge Test Guide to Prep for Exam

Take multiple practice exams in prep for knowledge exam

Microsoft Flight Simulator

Student Pilot Lessons:

Practice what you've learned: Fly the long cross country flight in next lesson.

Completion Standards: At the end of this solo flight, the student should be developing greater confidence in his or her ability to fly an airplane.

LESSON 21. SECOND DUAL (LONG) CROSS-COUNTRY FLIGHT (Ground 1.2/Flight 3.0) – Dual XC

Objective: This is a cross–country flight over a triangular course requiring at least three hours of flight time. It uses pilotage, dead reckoning, landfall and VOR stations for navigation (GPS moving maps not allowed on this lesson). Class D, C, and B airspace and special use airspace are also introduced/reintroduced in this lesson. At the completion of this lesson, the student should be prepared for VFR navigation over strange courses, and have the ability to cope with common cross–country emergencies.

1. Preflight discussion
    a. Review homework
    b. Filing a flight plan
2. V F R navigation – Do
    a. Pilotage – Do
    b. Dead reckoning – Do
    c. Landfall navigation – Do
    d. VOR navigation – Do
3. Lost procedures – Demo/Do
4. Class D, C and B airspace procedures
    a. Establishing communication with ATC facility
    b. Obtaining Class B entry clearance
5. Special use airspace procedures (as applicable)
    a. MOA's (as applicable)
    b. Restricted/Alert airspace (as applicable)
    c. Prohibited airspace (as applicable)
    d. TFRs (as applicable)
6. Use of radio for enroute communications – Do.
    a. Basic radar flight following with Center
    b. Basic radar flight following with TRACON/RAPCON
    c. In-flight communication with flight service station
7. Cross-country emergencies – Do
    a. Simulated inadvertent encounter with adverse weather
    b. Diversion to another airport simulation
8. Postflight discussion.
9. Preview of next lesson.
    a. Short – and soft–field takeoffs and landings.
    b. Emergency radio assistance (DF and Radar).
    c. Flight planning and preparation.

Lesson Philosophy

- It's entirely possible that your students will have an iPad or tablet device with some type of navigational software installed on it (e.g., WingX, Foreflight, FlyQ, etc.). The question is, should you let your students use this software during flight planning and on their cross country flight? My response is always the same: Let them use higher technology but *only* after they've learned the basics without that technology. That means your students should know how to create a flight log, and fill it out completely by manually calculating time and fuel values. It also means knowing how to plot and measure courses on a paper sectional chart. Yes, you can purchase them via the internet if they aren't available at a local pilot supply store. That means, at a minimum, the very first cross-country should be planned and flown via a paper flight log using an actual sectional chart. Only then should a student be allowed to use the flight planning software and moving map shown on their navigational software.
- Autopilots? Yes, your student might have one in his or her airplane. If so, I hope you'd teach that student how to hold a heading using rudders (no aileron) *before* ever allowing that student to use his or her autopilot. What navigational chores? How about modifying an in-flight flight log, folding a sectional chart and so on.
- Learn more about how technology can affect your students by

Next Lesson Homework

Plan Assigned Cross Country Flight

1. Draw route(s) on sectional/TAC chart
2. Pick checkpoints/plot course
3. Plot VOR course (TO/FROM) bearings (if used)
4. Consult performance charts
5. Create initial flight log
6. Obtain NOTAMS, Wx Briefing
7. Consult Digital Chart Supplement (d-CS)
8. Morning of flight, use current winds for DR routes
9. Then calculate times, distances, fuel consumed
10. File flight plan

Ideally, the Private Pilot Knowledge Exam should be passed prior to solo cross country flight.

Microsoft Flight Simulator

Student Pilot Lessons:

Practice night flying on Simulator – Set simulator to local airport at night and fly.

Fly the solo cross country you plan on flying solo in next lesson.

Completion Standards: At the completion of this lesson the student should now ready to fly a short cross-country on his/her own to a local airport then build solo cross-country experience to other, more distant airports (if the student so desires).

LESSON 22. SOLO CROSS-COUNTRY FLIGHT (Flight 1.5) – First Solo XC Flight

Objective: This solo cross-country flight should be over a relatively simple course with landings at two or more unfamiliar airports, preferably at least one with a control tower. A VFR flight plan should be filed when feasible, and flight following service should be requested.

1. Preflight discussion
    a. Approval of flight plan
    b. Weather analysis
    c. Filing a flight plan
2. VFR navigation
    a. Fly the cross-country trip solo
    b. Obtain flight following
3. Postflight discussion
    a. Critique on all unanticipated events and operations
4. Preview of next lesson
    a. Dual night flight

Next Lesson Homework

Rod Machado's How to Fly an Airplane Handbook
Chapter 14, *Night Flying*
Rod Machado's Plane Talk
Chapter 16, *See and Avoid,* Page 359
Airmen Certification Standards
Read, *XI-Night Operations:* A
Read, *XII-Parking and Securing:* A

Microsoft Flight Simulator

Student Pilot Lessons:
Practice what you've learned: Free flight
Re-fly the same cross country you previously flew.

Completion Standards: At the end of this flight the student will have acquired greater confidence in his/her ability to plan a trip and fly that trip.

LESSON 23. DUAL NIGHT FLIGHT (Ground 1.2/Flight 1.3) – Local Night Flight Introduction

Objective: This lesson familiarizes the student with the special considerations and problems characteristic of flight at night. During this first night lesson, it's recommended that the lesson starts at twilight, so that the student can experience the transition from daylight to night flight conditions. This lesson will provide at least five of the required 10 full stop landings at night.

1. Preflight discussion – Instruction and review
   a) Review homework
   b) Night flight equipment preparation
   c) Airplane readiness for night flight
2. Differences in visual references available at night – Demo/Do
   a) Absence of visual references over desert – Demo
   b) Obstacle avoidance techniques at night– Demo
3. Visual illusions at night – Demo
4. Takeoff and departure alignment techniques – Demo/Do
5. Interpretation of aircraft and obstruction lights – Demo
6. Airport lighting
   a) Runway edge lighting – Demo
   b) Loss of runway edge lighting – Demo
   c) Pilot control of airport lighting – Demo/Do
   d) REIL/VASI/PAPI lighting – Demo
7. Power approach and landings – Do
8. Use of landing lights – Do
   a) Landing with landing lights – Do
   b) Landing without landing lights – Do
   c) Landing with loss of runway edge lighting – Do
   d) Completion of first 5 of the required full stop night landings
9. Flight maneuvers over dark areas – Do
   a) Spatial disorientation – Demo/Do
   b) Emergency instruments use at night – Demo/Do
10. Postflight discussion
11. Preview of next lesson
   a. Solo cross–country flight
   b. Assignment
   c. Procure necessary equipment
   d. Prepare flight log
   e. Assign homework

Lesson Philosophy

- There' nothing like flying at night to remind a pilot why he or she is learning to fly. It can be quite beautiful. Well, it's only beautiful if you can see it. And sometimes that's the problem, because students often just don't understand that their eyes have to *adapt* to night flying. So please read the article titled, *The Dark Night Rises* in Appendix-1 to learn more about this.
- If there is ever a time to experience a dangerous visual illusion, it's at night. Your students need to know about these illusions to avoid becoming one of their many victims. Please read the article titled, *Night Magic* in Appendix-1 to learn more about this.
- During this lesson, you'll want to begin focusing more on the ACS as a means of evaluating your student's overall ground and flight knowledge. The student should be able to define and discuss the risk management areas defined in the ACS for each required task.

Next Lesson Homework

Aeronautical Information Manual

Section 1: Aeronautical lighting Aids

Section 2: Air Navigation and Obstruction Lighting

Plan Assigned Cross Country Flight

1. Draw route(s) on sectional/TAC chart
2. Pick checkpoints/plot course
3. Plot VOR course (TO/FROM) bearings (if used)
4. Consult performance charts
5. Create initial flight log
6. Obtain NOTAMS, Wx Briefing
7. Consult Digital Chart Supplement (d-CS)
8. Morning of flight, use current winds for DR routes
9. Then calculate times, distances, fuel consumed
10. File flight plan

Rod Machado's Plane Talk

Student Personal Selections

Microsoft Flight Simulator

Student Pilot Lessons:

Practice what you've learned: Fly the cross country flight in next lesson.

Completion Standards: At the completion of this lesson, the student should be able to operate in the traffic pattern safely at night (instructor permitting). No flight to the practice area should be allowed at night until the student has obtained his or her private pilot certificate. Period!

LESSON 24. SOLO CROSS-COUNTRY FLIGHT· (Flight 1.5) –Second Short Solo Cross-Country Flight

Objective: This solo cross-country flight should be flown using dead reckoning, pilotage, landfall navigation and VOR navigation under a VFR flight plan. The selected airports should be longer in distance than the first solo cross-country flight.

1. Preflight discussion
    a) Review homework
    b) Instructor's approval of flight log
    c) weather analysis
2. Filing and closing of flight plan
3. VFR navigation
4. Enroute radio communications
5. Unfamiliar airport procedures
6. Postflight discussion
    a) Critique of any unanticipated incidents
    b) Assign homework
7. Preview of next lesson
    a) Night cross-country flying techniques

Next Lesson Homework

Plan Assigned Cross Country Flight

1. Draw route(s) on sectional/TAC chart
2. Pick night checkpoints/plot course
3. Plot VOR course (TO/FROM) bearings (if used)
4. Consult performance charts
5. Create initial flight log
6. Obtain NOTAMS, Wx Briefing
7. Consult Digital Chart Supplement (d-CS)
8. Morning of flight, use current winds for DR routes
9. Then calculate times, distances, fuel consumed
10. File flight plan

Rod Machado's How to Fly an Airplane Handbook

Review critical/deficient areas

Rod Machado's Private Pilot Handbook

Review critical/deficient areas from knowledge exam

Rod Machado's Plane Talk

Student Personal Selections

Microsoft Flight Simulator

Student Pilot Lessons:

Practice what you've learned: Fly the cross country flight in next lesson.

Completion Standards: At the completion of this lesson the student's confidence should be building toward that expect of someone with a private pilot certificate.

LESSON 25. DUAL (LONG) NIGHT CROSS-COUNTRY FLIGHT (Ground 1.2/Flight 2.3) – 100 NM Dual Night XC
Objective: This lesson familiarizes the student with the special considerations and problems characteristic flying cross-country at night. This lesson will provide the last five of the required 10 full stop landings at night.

1. Preflight discussion
   a) Review homework
   b) Instructor's approval of flight log
   c) weather analysis
2. Filing and closing of flight plan
3. VFR navigation
4. Enroute radio communications
5. Unfamiliar airport procedures
6. Second 5 of the 10 full stop landings
7. Postflight discussion
   a) Critique of any unanticipated incidents
   b) Assign homework
8. Preview of next lesson
   a) Night cross-country flying techniques

Lesson Philosophy

- There's very little confidence to be acquired using a GPS moving map display when learning cross country navigation as a student pilot. My advice is to compel your student to use VOR navigation, instead. Tracking a course using a CDI builds a lot of skill and confidence. If VOR navigation isn't possible, then have the student use the GPS CDI for tracking. At least this method helps build the navigational-imagination rather than simply exercising the navigational-imagination by watching a moving map display.

Next Lesson Homework

Plan Assigned Cross Country Flight

1. Draw route(s) on sectional/TAC chart
2. Pick checkpoints/plot course
3. Plot VOR course (TO/FROM) bearings (if used)
4. Consult performance charts
5. Create initial flight log
6. Obtain NOTAMS, Wx Briefing
7. Consult Digital Chart Supplement (d-CS)
8. Morning of flight, use current winds for DR routes
9. Then calculate times, distances, fuel consumed
10. File flight plan

Rod Machado's How to Fly an Airplane Handbook
Review critical/deficient areas
Rod Machado's Private Pilot Handbook
Review critical/deficient areas from knowledge exam
Rod Machado's Plane Talk
Student Personal Selections

Microsoft Flight Simulator

Student Pilot Lessons:
Practice what you've learned: Fly the long cross-country flight in next lesson.

Completion Standards: At the completion of this lesson the students should feel comfortable with making short night cross-country flights after obtaining his or her private pilot certificate. The student will feel more comfortable with longer night cross-country flights after making the long cross-country fight in the next lesson. It's the author's opinion that no night cross-country flights should be allowed until the student obtains his or her private pilot certificate.

LESSON 26. LONG SOLO CROSS–COUNTRY FLIGHT (Flight 2.5) – 150 NM/Landing More Than 50NM/With 3 Full Stops
Objective: This lesson provides additional cross–country experience and meets the FAR requirement for the long cross-country flight. This flight consists of a solo cross-country flight covering a minimum total distance of 150 nautical miles with a full stop landing at three points, including a straight-line segment of more than 50 nautical miles between the takeoff and landing locations.

1. Preflight discussion
    a) Review homework
    b) Instructor's approval of flight log
    c) weather analysis
2. Filing and closing of flight plan
3. VFR navigation
4. Enroute radio communications
5. Unfamiliar airport procedures
6. Postflight discussion
    a) Critique of any unanticipated incidents
    b) Assign homework
7. Preview of next lesson
    a) Private pilot checkride preparation
    b) Assign homework

Next Lesson Homework

Rod Machado's How to Fly an Airplane Handbook
Review critical/deficient areas
Rod Machado's Private Pilot Handbook
Review critical/deficient areas from knowledge exam
Rod Machado's Plane Talk
Student Personal Selections
Airmen Certification Standards
Read, *VII-Slow Flight and Stalls:* C, D
Read, *IV-Takeoffs, Landings, Go-Arounds:* M, N

Microsoft Flight Simulator

Student Pilot Lessons:
Practice what you've learned: Free flight

Completion Standards: At the completion of this flight, the student should be competent to make VFR cross–country flights upon receiving his or her private pilot certificate.

LESSON 27. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Practice Flight Test Maneuvers

Objective: Active preparation for the private pilot flight test begins with this lesson. The FAA Airman Certificate Standards (a.k.a. *Practical Test Standards*) should be used for guidance on the procedures and standards to be applied to all flight maneuvers. At the completion of this lesson, the student should be prepared to practice all the required light test maneuvers solo.

1. Preflight discussion
    a) Review homework
    b) Review of ACS
    c) Pilot and airworthiness requirements
    d) Decision making: Risk management/situational awareness/judgment
    e) Preflight/passenger briefing
2. Engine start
    a) Use of checklists – Do
    b) Cockpit management – Do
    c) Taxiing – Do
    d) Runup and "before takeoff" checklist – Do
3. Slow flight
    a) At minimum controllable airspeed – Do
    b) Slow flight maneuvering (turns, climbs, descents) – Do
4. Stalls
    a) Power-off (full and imminent recovery) – Do
    b) Power-on (full and imminent recovery) – Do
    c) Accelerated stalls
    d) Spin awareness – Do
5. Steep turns – 360 degrees – Do
6. Flight by reference to instruments
    a) Straight and level – Do
    b) Level turns to specific headings – Do
    c) Climbs and descents to specific headings – Do
    d) Unusual attitude recovery – Do
    e) VOR navigation by Instruments – Do
7. Navigation
    a) Dead reckoning/pilotage/landfall – Do
    b) VOR course interception, track and triangulation – Do
    c) Diversion – Do
8. Ground reference maneuvers – Do
9. Traffic pattern operations – Do
10. Normal and crosswind takeoffs and landings – Do
11. High performance takeoffs and landings – Do
12. Balked takeoff and landing recoveries
13. Slips to landings/go-arounds – Do
14. Postflight discussion
15. Preview of next lesson
    a. Practice Flight Test Maneuvers Solo
    b. Solo practice as directed
    c. Assign homework

Lesson Philosophy

- Is your student getting a bit of checkride-itis? If so let me help by providing you with two articles to read. This will help you better understand your student's situation and allow you to help your student. *Read, A Checkride Persona* (Appendix-1) to help your student better understand how to act on the practical flight test. You'll also want to read, *Checkride-itis* (Appendix-1). It will provide you with a few solutions in helping your student relax on the checkride.

Next Lesson Homework

Rod Machado's How to Fly an Airplane Handbook
Review critical/deficient areas
Rod Machado's Private Pilot Handbook
Review critical/deficient areas from knowledge exam
Rod Machado's Plane Talk
Student Personal Selections
Airmen Certification Standards
Review appropriate sections for checkride

Microsoft Flight Simulator
Student Pilot Lessons:
Practice what you've learned: Free flight

Completion Standards: At the end of this lesson, any deficiencies in skill will be identified as needing further practice in preparation for the private pilot checkride.

LESSON 28. SOLO FLIGHT (Flight 1.3) – Practice Flight Test Maneuvers Solo

Objective: This lesson provides solo practice to develop precision in the performance of the flight maneuvers required for a private pilot certificate. It is suggested that emphasis be directed to coordination and the tolerances specified in the Airmen Certification Standards (ACS)

1. Preflight discussion
    a) Practice assigned maneuvers from previous lesson
2. Maneuvers practiced to tolerances specified in ACS
3. Other maneuvers as directed by the instructor
4. Engine start
    a) Use of checklists – Do
    b) Cockpit management – Do
    c) Taxiing – Do
    d) Runup and "before takeoff" checklist – Do
5. Coordination maneuvers
6. Slow flight
    a) At minimum controllable airspeed – Do
    b) Slow flight maneuvering (turns, climbs, descents) – Do
7. Stalls
    a) Power-off (full and imminent recovery) – Do
    b) Power-on (full and imminent recovery) – Do
8. Steep turns – 360 degrees – Do
9. Navigation (local flight)
    a) Dead reckoning/pilotage/landfall – Do
    b) VOR course interception, track and triangulation – Do
10. Ground reference maneuvers – Do
    a) S-turns across a road – Do
    b) Turns around a point – Do
11. Traffic pattern operations – Do
12. Normal and crosswind takeoffs and landings – Do
    a) Short and soft field takeoffs – Do
    b) Shot and soft field landings – Do
    c) Slips to landing – Do
13. Postflight review
14. Preview of next lesson
    a) Practice Flight Test Maneuvers Solo
    b) Solo practice as directed
    c) Assign homework

Next Lesson Homework

Rod Machado's How to Fly an Airplane Handbook
Review critical/deficient areas
Rod Machado's Private Pilot Handbook
Review critical/deficient areas from knowledge exam
Rod Machado's Plane Talk
Student Personal Selections
Airmen Certification Standards
Review appropriate sections for checkride
Microsoft Flight Simulator
Student Pilot Lessons:
Practice what you've learned: Free flight

Completion Standards: At the end of this lesson the student's self-evaluation of his or her performance should reflect increased proficiency as measured by the tolerances specified in the ACS.

LESSON 29. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Practice Flight Test Maneuvers

Objective: This lesson consists of the instructor's evaluation of the flight maneuvers practiced during the previous lessons, along with the student's evaluation of his/her performance. The required maneuvers are practiced and any deficiency in performance is corrected. The instructor shall assign directed solo practice as necessary to increase the student's flight proficiency to checkride standards.

1. Preflight discussion
    a) Practice assigned maneuvers from previous lesson
2. Maneuvers practiced to tolerances specified in ACS
3. Other maneuvers as directed by the instructor
4. Engine start
    a) Use of checklists – Do
    b) Cockpit management – Do
    c) Taxiing – Do
    d) Runup and "before takeoff" checklist – Do
5. Coordination maneuvers
6. Slow flight t minimum controllable airspeed – Do
    a) Slow flight maneuvering (turns, climbs, descents) – Do
7. Stalls
    a) Power-off (full and imminent recovery) – Do
    b) Power-on (full and imminent recovery) – Do
8. Steep turns – 360 degrees – Do
9. Navigation (local flight)
    a) Dead reckoning/pilotage/landfall – Do
    b) VOR course interception, track and triangulation – Do
10. Ground reference maneuvers – Do
    a) S-turns across a road – Do
    b) Turns around a point – Do
11. Traffic pattern operations – Do
12. Normal and crosswind takeoffs and landings – Do
    a) Short and soft field takeoffs – Do
    b) Shot and soft field landings – Do
    c) Slips to landing – Do
13. Postflight review
14. Preview of next lesson
    a) Practice Flight Test Maneuvers Solo
    b) Solo practice as directed
    c) Assign homework

Next Lesson Homework

Rod Machado's How to Fly an Airplane Handbook
Review critical/deficient areas
Rod Machado's Private Pilot Handbook
Review critical/deficient areas from knowledge exam
Rod Machado's Plane Talk
Student Personal Selections
Airmen Certification Standards
Review appropriate sections for checkride
Microsoft Flight Simulator
Student Pilot Lessons:
Practice what you've learned: Free flight

Completion Standards: At the completion of this lesson, the student's performance of his "air work" should be at an acceptable level for the private pilot flight test.

LESSON 30. SOLO FLIGHT (Flight 1.3) – Practice Flight Test Maneuvers Solo

Objective: This lesson should include solo practice of ground reference maneuvers, maximum climbs, and traffic pattern procedures. At the completion of this lesson, the student should be satisfied that he/she can perform "air work" to a standard acceptable for a private pilot flight test.

1. Preflight discussion
    a) Practice assigned maneuvers from previous lesson
2. Maneuvers practiced to tolerances specified in ACS
3. Other maneuvers as directed by the instructor
4. Engine start
    a) Use of checklists – Do
    b) Cockpit management – Do
    c) Taxiing – Do
    d) Runup and "before takeoff" checklist – Do
5. Coordination maneuvers
6. Slow flight
    a) At minimum controllable airspeed – Do
    b) Slow flight maneuvering (turns, climbs, descents) – Do
7. Stalls
    a) Power-off (full and imminent recovery) – Do
    b) Power-on (full and imminent recovery) – Do
8. Steep turns – 360 degrees – Do
9. Navigation (local flight)
    c) Dead reckoning/pilotage/landfall – Do
    d) VOR course interception, track and triangulation – Do
10. Ground reference maneuvers – Do
    a) S-turns across a road – Do
    b) Turns around a point – Do
11. Traffic pattern operations – Do
12. Normal and crosswind takeoffs and landings – Do
    a) Short and soft field takeoffs – Do
    b) Shot and soft field landings – Do
    c) Slips to landing – Do
13. Postflight review
14. Preview of next lesson
    a) Practice Flight Test Maneuvers Solo
    b) Solo practice as directed
    c) Assign homework

Next Lesson Homework

Rod Machado's How to Fly an Airplane Handbook
Review critical/deficient areas
Rod Machado's Private Pilot Handbook
Review critical/deficient areas from knowledge exam
Rod Machado's Plane Talk
Student Personal Selections
Airmen Certification Standards
Review appropriate sections for checkride
Microsoft Flight Simulator
Student Pilot Lessons:
Practice what you've learned: Free flight

Completion Standards: At the end of this lesson the student's self-evaluation of his or her performance should we within the tolerances specified in the ACS.

LESSON 31. DUAL FLIGHT (Ground 1.2/Flight 1.3) – Practice Flight Test Maneuvers
Objective: During this lesson, the student should practice to achieve the standard of performance required by the private pilot flight test on special types of takeoffs and landings.

1. Preflight discussion
    a) Practice assigned maneuvers from previous lesson
2. Maneuvers practiced to tolerances specified in ACS
3. Other maneuvers as directed by the instructor
4. Engine start
    a) Use of checklists – Do
    b) Cockpit management – Do
    c) Taxiing – Do
    d) Runup and "before takeoff" checklist – Do
5. Coordination maneuvers
6. Slow flight
    a) At minimum controllable airspeed – Do
    a) Slow flight maneuvering (turns, climbs, descents) – Do
7. Stalls
    a) Power-off (full and imminent recovery) – Do
    b) Power-on (full and imminent recovery) – Do
8. Steep turns – 360 degrees – Do
9. Navigation (local flight)
    a) Dead reckoning/pilotage/landfall – Do
    b) VOR course interception, track and triangulation – Do
10. Ground reference maneuvers – Do
    a) S-turns across a road – Do
    b) Turns around a point – Do
11. Traffic pattern operations – Do
12. Normal and crosswind takeoffs and landings – Do
    a) Short and soft field takeoffs – Do
    b) Shot and soft field landings – Do
    c) Slips to landing – Do
13. Postflight review
14. Preview of next lesson
    a) Practice Flight Test Maneuvers Solo
    b) Solo practice as directed
    c) Assign homework

Next Lesson Homework

Rod Machado's How to Fly an Airplane Handbook
Review critical/deficient areas
Rod Machado's Private Pilot Handbook
Review critical/deficient areas from knowledge exam
Rod Machado's Plane Talk
Student Personal Selections
Airmen Certification Standards
Review appropriate sections for checkride
Microsoft Flight Simulator
Student Pilot Lessons:
Practice what you've learned: Free flight

Completion Standards: At the completion of this lesson, the student's performance of his "air work" should be at an acceptable level for the private pilot flight test.

LESSON 32. SIMULATED PRACTICAL FLIGHT TEST (Ground 1.2/Flight 1.3)

Objective: This lesson should consist of the private pilot flight test conducted by the instructor exactly as such tests are conducted by inspectors and examiners. The student should be able to perform all required procedures and maneuvers in accordance with the Private Pilot Flight Test Guide.

1. Preflight discussion – Phase I of the private pilot flight test.
2. Private Pilot Flight Test – Evaluated by the flight instructor.
3. Postflight discussion – Critique of overall performance.

NOTE: Before signing a flight–test recommendation for his student, it is the responsibility of the flight instructor to see that he meets all of the flight experience requirements for a private pilot certificate, including the total flight time, dual instruction, solo–flight time, cross–country, and instruction in the control of an airplane by reference to instruments.

Appendix-1

Making a Living as a CFI

By Rod Machado

I can't tell you the number of times I've heard someone say, "You can't make a living as a CFI." For some people this may be true, but it doesn't have to be. Given enough experience and the right conditions, you can easily make a decent living as a flight instructor.

There probably has never been a better time to be a flight instructor. The airlines are hiring, which makes it difficult for many flight schools to hold onto their high-time instructors. Look in any major aviation publication and you're sure to see wantads for CFIs. In my travels around the country I've even heard of FBOs closing their doors or eliminating their flight training departments because they can't find qualified CFIs. If you're interested in working as a full time flight instructor, here are a few things to consider.

Before a flight instructor can expect to make a reasonable wage, he or she needs a little seasoning. Expecting a top-dollar hourly fee during the first year of teaching is unreasonable. Those with a few years experience in the business, though, can expect to charge fees ranging from $35 to $60 an hour (and higher).

I know several CFIs who charge $500 a day for training in specific airplane types. These folks have acquired enough additional training to qualify themselves as experts in specific makes and models of airplanes: Malibus, Bonanzas, cabin class twins, etc. One CFI that I know has developed such a well established reputation that operators fly their airplanes from all over the United States to his home airport just for a full day of specialized training. He's fully booked months in advance.

Treating flight instruction as a business is the key to making a good living. For instance, many years ago I ran into a CFI in the California area (let's call him Hank) who makes well over $50,000 a year as a full time flight instructor. Here's his strategy.

First, Hank has his students sign a *contract* for at least three two-hour lessons per week. This forces them to make a strong commitment to flight training. If the student has to cancel, the lesson can be rescheduled if notice is given at least 24 hours in advance. The results of a missed or hastily cancelled lesson are clear: payment is expected regardless of the excuse.

Given that each student consumes six hours of his time per week, Hank limits himself to working with only five clients at a time. This totals 30 hours of revenue producing time per workweek. An additional 10 hours of non-revenue time is invested in lesson planning and recording keeping, resulting in a 40-hour work week.

The beauty of this arrangement is that Hank makes money even when grounded by poor weather. After all, students need ground instruction in preparation for their license. He never fell into the trap of thinking that ground instruction deserves less recompense than airplane instruction. Why should it? After all, ground instruction has its own inherent risks. What about getting bitten by the airport dog, or poisoned by airport coffee? (The secret here is to get the dog to drink the coffee.)

Hank charges $35 an hour for flight or ground instruction. At 30 hours per week, this produces a guaranteed weekly income of $1050. Over a 50 work-week year, he earns a minimum annual income of $52,500 from flight instruction. This doesn't include income from other peripheral activities associated with flight training such as finder’s fees for airplanes sold, consulting fees, or other services rendered. In reality, Hank makes well over $52,500 per year.

Although Hank now relies strictly on word-of-mouth advertising, he originally advertised in medical and legal magazines. He'd place a small classified ad that offered a free consultation for anyone considering flight training. During the consultation, he'd explain his flight training program, the contract, and the pros and cons of owning an airplane. Of course, he always dressed professionally and had professional brochures to distribute, too.

Can you see why Hank was successful? He directed his marketing to the folks with sufficient disposable income. Sure, not everyone can afford to pay his prices, but Hank isn't marketing himself to these folks.

Can you earn a similar living as a CFI? With a few qualifications, I'd say, "Absolutely." First, being in a large metropolitan area helps. Good weather helps, too, though with the sophistication of modern simulators the weather is becoming less and less of a hindrance to flight training, even for those taking primary instruction.

The next time someone says that it's not possible to make a good living as a CFI, please mention Hank's story. Remember, the average CFI in the business is becoming less and less experienced (they're all getting hired by the airlines). Therefore, it's not unreasonable to expect that the chances of making a good living as a full time CFI are becoming better and better.

Lesson-1

First Contact

By Rod Machado

Trust is the key. First-time passengers consider the pilot a custodian of their being. That's why it's important to act in a manner that develops trust.

When introducing someone to aviation (as a pilot or instructor), be sensitive to their needs. I'm not talking about the kind of sensitivity where someone feels they need to free all the slaved gyros. I'm talking about the common courtesy of recognizing what scares and intimidates the novitiate. Here's how we might do this.

First, I always ask first-time passengers what they expect the experience will be like. From there I amend, modify or restructure their perception. This alleviates anxiety and helps avoid potential surprises for them.

Second, as a flight instructor, I always make the following statement before departure. I say, "Listen, I want you to enjoy your flight today. If you desire, I'd like you to get a feel for the airplane's controls. No matter what you may do, I won't let anything hurt you, me or the airplane. I say it with a sincere, slow and steady voice knowing that it has a direct affect on the trust placed in me. It's the most important statement I make in the airplane. (And don't make it unless you can fulfill its promise.)

It's reasonable to say that we probably drive more people away from aviation than we attract. Sometimes we scare them with our maneuvers. Sometimes we exaggerate the difficulty in learning to fly (we're often like Kamikaze pilots who did all their braggin' ahead of time). In either case, we don't develop the trust necessary to give the aviation ambitions of our charges a fighting chance at survival. While this isn't the final solution to aviation's growth problem, it's a place where everyone—pilots and instructors—can contribute.

Control Hogs

By Rod Machado

A student pilot came up to me and said, "My instructor doesn't let me fly all that much. He's always hogging the controls, demonstrating this and demonstrating that. I feel like he's flying on my money."

Hmmm, most of us have heard something like this before. It seems that some instructors are more interested in showing off for their students than they are in helping them learn. Remember, as flight instructors, we're not there to show our students how good we are; we're there to show them how good they can be. This means they need stick time. So let 'em have it.

There are times when it's absolutely necessary to demonstrate a maneuver. It may even be necessary to demonstrate a maneuver three, four or five times in a row. This is how I learned to land in a crosswind. I asked my instructor to show me how it was done. Then I asked him to do it several more times. Watching

was tremendously beneficial. But when it was my turn, it was my turn. Had he grabbed the controls from me the moment I wasn't flying to his satisfaction, I would have felt cheated. More important, I might have felt like he didn't trust me. Pity the poor student whose instructor always takes the controls away, especially during taxi.

Over the years, I've noticed that the best instructors are just as capable with language as they are with their hands during flight training. Sure, they demonstrate when necessary, but they prefer to talk their students through the maneuver when possible. This is more easily done when the instructor couches his or her instructions in *behavioral* terms.

For instance, instead of telling a student to get the nose up the instructor might tell him to place the tip of the cowling on the horizon. Instead of telling a student that she needs more right rudder, he might tell her to push the right rudder in by one-half inch. Instructors who identify their objectives in behavioral terms won't need to touch the controls as often during flight training.

If an instructor has sufficient skill at communication, it's entirely possible (and probable, too) that students, on their very first lesson, will taxi, take off and perform basic airwork *all by themselves*. This can be a real confidence booster. But if instructors are always grabbing for the flight controls, this will diminish their student's performance in the long run.

Hand to Hand Instruction

By Rod Machado

Airplanes with side-by-side seating offer instructors a wonderful opportunity to apply a unique teaching technique. Your seating proximity allows you access not only to your student’s flight controls, but to their arms and legs. Why not take advantage of this?

I discovered how useful this technique was with a student who was reluctant to push the throttle in for takeoff. I said, “Betty, push the throttle in all the way.” She inched the throttle forward at a snail’s pace. “I’m afraid I’ll hurt the pistons,” she replied. I looked over at her and said, “Don’t worry, this is a rental and rental pistons have no feelings. Now, move that throttle forward, OK?” Finally, I just reached over, and put my left hand around her wrist and pushed in at the appropriate rate. Her first comment was, “Oh, so that’s how to do it.” From that moment on I realized that mere words often can’t convey what the physical sensation of pressure can.

It’s one thing for students to follow you through a maneuver with their hands on the controls. A good practice, indeed. But they can’t accurately sample the control pressures involved because you’re the one applying the pressure. Using their wrist as a handle, they obtain the tactical sensation of pressure resulting from their hand contacting the flight control.

Try this technique the next time your student is having trouble maintaining level flight. Place your hand on their wrist and level the airplane for them. They’ll quickly develop a sense for the pressures involved.

This technique becomes immensely useful in preventing students from over controlling during landing. I’ve guided students through the approach, roundout and flare with my left hand controlling the aileron and elevator through their wrist.

You can even apply palm pressure to a student’s knee to initiate rudder movement. During flight, students should have their heels on the floor and apply rudder pressure with the balls of their feet. Therefore, a slight push down and forward on the knee moves the ball of the foot forward. Fortunately, it’s right rudder that’s most often needed and that’s the leg that’s easiest to get to.

One word of caution. Always make sure you obtain the student’s permission before pushing on any part of their body. Let the student know what you’re going to do and demonstrate how you’ll do it. Do this and you’ll only push a wrist and never push your luck.

Lesson-2

Why Ground Instruction is Important

By Rod Machado

There's one thing you can do for your students that reduces the cost of their flight training as well as the time it takes them to obtain a private pilot certificate. *Give them more ground instruction*.

The average flight instructor spends about 15 to 30 minutes with his or her students discussing the lesson prior to flight. The ratio of flight time here to ground time is approximately 2 to 1. I'd like to argue that it should be at least 1 to 2, the exact opposite of what many instructors now offer. Here's why.

The classroom is a very effective place to help students acquire an *understanding* of the skills to be learned, while the airplane is an excellent place to *practice* those skills. Unfortunately, some instructors attempt to accomplish both in the air.

Imagine how challenging it is for a student to try grasping the relationship between angle of attack and airspeed while trying to fly at the same time. Expressed another way, imagine that you are in the ground school classroom, speaking loudly to your student via a portable headset-intercom system, while he holds a joystick and flies a simulated airplane on a laptop PC. Now try discussing the relationship between angle of attack and airspeed. Do you think a student learns the basics more efficiently when he or she has multiple distractions to deal with? I don't think so. This is what students experience when instructors try conveying an understanding of aviation principles in the air instead of on the ground first.

Let your students practice on the ground what they've learned or will be learning in the airplane. Help them understand the real value of classroom time, and make sure you charge them for it, too. It should be an easy sell, because your students are going to progress much faster, and ultimately spend less money and time acquiring their private pilot certificate.

A Matter of Influence

By Rod Machado

No written word nor moral plea
Can teach our students what they should be,
Nor all the books upon the shelves
But what the teachers are themselves.

In the movie *Angels With Dirty Faces,* racketeer Rocky Sullivan (played by James Cagney) returns to his old neighborhood after release from prison. Parish priest Jerry Connelly (played by Pat O'Brien) is dismayed when he finds that the neighborhood boys have come to idolize Rocky's gangster image.

Rocky eventually commits murder, returns to prison and is preparing to pay for his crime with his life. In an attempt to save his young charges from a similar fate, Father Connelly pleads with Rocky to publicly shed his toughguy image.

He does.

In one of the most dramatic scenes in film history, Rocky whimpers, screams and begs for release as he's led to the execution chamber. Evident on each youngster's face is the indelible impression of Rocky's final act of redemption. While only a movie, the plot speaks to the powerful influence of a role model.

Psychologists have known for a long time that our basic attitudes, beliefs and values are easily influenced by our role models. For this reason, flight instructors should use this tool to their advantage in positively influencing the way their students think, act and behave.

A role model's influence became apparent to me as a young flight instructor during a student's dual cross country flight. We departed into marginal VFR weather with visibilities ranging from three to five miles.

Increasing visibility was forecast for the route. Twenty minutes into the trip, it became obvious that the weather was getting worse, not better.

I glanced over at the student and said, "Bob, let's go home. This is not reasonable weather in which to be flying." Bob glanced over at me with a surprised look on his face, like that of a just gelded bull.

"Wow," he commented, "you mean there's weather that you won't fly in?"

"Of course there is," I responded. "This airplane isn't equipped for IFR flight and there's no way to be sure we can complete our flight safely with this visibility."

End of story. Or so I thought.

Last year I received a call from Bob for a flight review. We met, shook hands and reminisced. His first comment to was, "I'll never forget the time you *chickened-out* on our cross country because of bad weather. It left one heck of an impression on me and I fly more cautious because of it."

Although I was amused by his choice of words, it's obvious that my chickening-out was pure *poultry in motion* when it came to his education.

I've always made it a point to let students witness those limits beyond which I won't go. In the spirit education, I've even created situations where a student witnessed my response to a critical situation. A little choreography and a touch of planning often provides for long lasting impression.

On several occasions I've made afternoon trips to high density altitude airports knowing that my student and I would be grounded until sunset (these were airports with good restaurants, of course). Once the air cooled sufficiently, we'd calculate our takeoff performance and slip into the sky. Admittedly, I knew the airplane could depart safely with reduced performance. The takeoff charts, however, provided enough evidence to suggest a cautious course of action. I played this up knowing that best gift we can give our students is to let them observe our willingness to concede defeat.

The general rule in role modeling is to let your students observe you in the act of performing, considering or rejecting an *important* course of action. Once a student observes this behavior, he or she is likely to model that behavior to some degree. When they see you call for a weather briefing before every flight, they will likely do the same when flying solo. The same goes for calculating a weight and balance prior to departure. Preflighting, using checklists, and scanning for traffic are but a few of the additional opportunities you have to make permanent impressions as a role model.

Some of the most important lessons your students learn have nothing to do with flying technique. They have everything to do with your demeanor—your beliefs, values and attitudes. Since students hang on your every word, make it a point to act in their presence the way you want them to act when they're alone. You are their role model.

Lesson-3

Communication as Teaching

By Rod Machado

Have you ever asked a student to do his homework before a flight, only to have him fail to comply? You did, after all, communicate with him, but that didn’t produce the desired behavior, did it? Since you are a teacher, you might consider using your teaching skills and teach him to do it using the same skills you use to change someone’s behavior in the cockpit.

For instance, if you want to produce a specific behavior in the cockpit you demonstrate that behavior, then have the student perform it under your supervision and offer feedback on what you observe. So begin by demonstrating the study behavior you want your student to mimic. Sit him down and go through the SQ3R method of studying (scan, question, read, review, recite). Next, you’ll tell him to text you when he begins his study period as well as when he ends his study period. This ensures compliance in much the same way that verbally reminding your student to look outside the cockpit cues him to maintain his scan for traffic. Finally, you’ll tell him to text you again when he’s finished his study period, at which point you’ll either send a congratulations text or you’ll text him a few question he must answer to check on his progress. This will help motivate him to better understand his material.

Now, there are many ways to seek compliance with homework obligations and this is just one of them. But it is a good example of how to use your teaching skills to modify your student's behavior.

Remember that we teach other how to behave towards us, not only in the cockpit but out of it as well. So use your teaching skills as a means to better communicate your desires and wishes and produce more desirable behavior as a result.

Homework: A Question and Answer

By Rod Machado

Hi, Rod:

I'm a fairly new CFI and would like to get another opinion about one of my students. I can't get him to open a book. He's already soloed, but just doesn't want to do ground instruction (he says he can't afford it. I tell him he can't afford NOT to do it). I'm getting ready to drop him because I see that it's going to be like this all down the line and it's wearing me out!! It's like he gets angry when I ask him to come into the classroom to give him an idea of what to expect for our flight. I'm getting ready to can him. I'm tired of spoon feeding him. My other students are extremely motivated and are a joy to work with, so I know it can't entirely be me. What do you suggest?

Yours,

Anne

Greetings Anne:

You're right. He can't afford to avoid ground instruction. It will cost him in the long run. First, let's assume that his unwillingness to study isn't based on a personal limitation that prevents him from reading, like dyslexia. If so, he may avoid the classroom for fear of embarrassing himself if this disability became known. I suggest being direct and asking him (nicely) "I notice you are having more trouble than most people enjoying the non-flying part of learning aviation. Is that because of any specific learning problems you've experienced?" This should give you a clue as to how to proceed. He might be better off studying videos instead of books. I suspect, however, that this isn't the problem.

It's more likely that he's just plain lazy. Yes, people can be lazy, like those who get up at the crack of noon. If so, try this.

First, let him know that all future flights will be conditional, based on his having completed the assigned homework assignment (be specific about what you want him to study). Inform him that you'll review the homework before each flight. If it's apparent that he hasn't done this work, then the flight is cancelled. Second, make sure he understands that he's obligated to pay you for the time blocked on the cancelled lesson. Third, always make sure he keeps sufficient funds on account. If this doesn't turn him around, then furlough him. The last thing you want is your name in the logbook of someone who doesn't take flight training seriously.

Preflight Video

By Rod Machado

Most flight instructors spend a lot of time reviewing the proper preflighting of the airplane with their students. Yet even when students see the preflight firsthand once, twice or perhaps 10 times, they still forget to check critical items. There *is* a way a flight instructor can literally help his or her student get the picture.

The answer is your *iPhone* (or video camera, which you can probably beg or borrow from a family member, friend, or maybe even student if you don't already own one). By whatever (legal) means, get your hot little "Francis Ford Coppola" hands on a camera and make a preflight video for your students. It's a job you'll only have to do once, yet it will be worth its weight in Oscars when provided to each new student

prior to the second flight lesson. Doing so will help your students do a more consistent and complete preflight, and will allow you to accelerate their training. That makes your job much easier.

You don't need to be a Hollywood or French movie-director genius behind the camera to make a preflight video. Anyone "Cannes" do it. All you need is a buddy to hold the camera and point it in the right general direction as you do the preflight. Your job is to walk and talk. If you need to make a closeup of a particular part of the airplane, move the camera closer to that point (or use the zoom feature that's available on virtually every camera these days). You don't need fancy cuts and fades to make an acceptable video. Just pause the video during the recording process if you need to move closer to or farther from the airplane.

You can even have a little fun in the process. A few sight gags will help liven up your video. For instance, hide a stuffed bird under the wing. When you "discover" it, say "Ah, *there* are those missing wings." Or put a plastic owl in the cowl, and when you find it, say "Don't forget to check the *owling* on every preflight." Don't get carried away—one or two jokes is more than enough in the course of a walkaround.

Give the video to all your new students, and make sure you get it back. You certainly don't want it to end up in the wrong hands, lest you find it entered in the "Trash" Cannes Film Festival.

Suburi Training

by Rod Machado

The 1984 movie *The Karate Kid* revealed a rare pedagogical truth of immense value to flight instructors. The movie centers around Daniel, who volunteers to polish the car and sand the deck of his neighbor Mr. Miyagi (a martial arts master). Miyagi insists that Daniel use a "wax on, wax off" hand motion to do the job. Daniel eventually tires of the mundane repetitive action and prepares to show Miyagi his "buzz off" technique. Miyagi feels the time is right for a lesson and throws a punch toward Daniel. Daniel effortlessly blocks the punch with an unconscious, reflexive "wax on, wax off" hand movement. It turns out that most repetitive and mundane acts of training are sometimes the most useful ones to learn.

Martial arts training relies heavily on building habits and reflexes through a repetitive "wax on, wax off" type of training. The Japanese even have a word for these repetitive individual exercises: *suburi*. The good news here is that you can use suburi training to accelerate your student's development of any flight skill. Doing so requires that you identify the *fundamental* building blocks on which those skills are based, then guide your student in practicing those fundamentals repetitively to perfection. Given the ubiquity and sophistication of today's flight simulator (desktop or full motion with rudder pedals), these devices lend themselves exceptionally well to these repetitive individual exercises.

While we can apply the suburi training method to any area of flight training, let's apply it to teaching a student pilot basic landing skills.

Learning to land requires mastery of *several* fundamental skills, two of which are rudder and aileron coordination and attitude control. Without these skills, the student can't keep the runway picture stabilized in the windscreen. What all students need is the *precision* to hold that tiny black strip of asphalt steady as it ominously expands in the windscreen. Here is where isolating the precise motor behaviors required for coordination and attitude control leads to an accelerated rate of learning.

Begin with the (simulated) airplane on a one-mile final at an altitude where a power-off descent can be made to the runway at approach speed. Set the program for calm winds and mild turbulence. Save these settings. Now let the games begin.

The moment a wing rises due to turbulence (and it will), instruct your student to *immediately* apply aileron to lower the wing and rudder pressure to cancel the effects of adverse yaw. Don't let that nose yaw even a tiny bit from the direction it points! The moment the nose pitches away from the attitude necessary to maintain approach speed, *immediately* apply elevator pressure to return and maintain the desired attitude. As the airplane crosses the threshold, repeat the exercise from the previous starting point. These two fundamental behaviors are the equivalent of Miyagi's fundamental "wax on, wax off" defensive hand movements, neither of which require use of the karate yell "heeyaw," which means "ouch" in Japanese.

The objective of this suburi exercise is not to land the airplane. It's to become skilled enough to hold the expanding runway steady in the windscreen through precise heading, bank and attitude control. Why are these skills important? If your student can observe a steadily (and steady) expanding runway long enough during the approach, he or she is better able to judge where to begin the flare for landing. This is why it's easier to swat a fly at Chuck's Chicken eBowla restaurant after it lands instead of while it's flying. Aside from killing Chuck's customer of the month, swatting a landed fly proves that it's easier to hit something once it stops moving. It's also easier to land on a runway once it stops moving all over your windscreen.

As our instructor friends from south of the border might say, "Let's take the training up a nacho," by increasing the turbulence level and, followed by adding a crosswind to the mix. Repeat this exercise from the original starting point. How many times? As many as it takes for the student to master these fundamental behaviors. If your student expresses his frustration at the boring repetition, don't throw a fake punch at his noggin. He might be a wood sander or a car polisher, and you'll end up on the deck with your nose polished.

. By isolating the fundamental behaviors of this (or any) skill and practicing them repetitively, your student will increase the speed at which he or she learns to land. The side benefit here is that this training can be done at home—inexpensively—on the student's desktop flight simulator.

Suburi training is an effective way to master *any* higher-order skill. This includes slow flight, steep turns, stall recoveries, chandelles, lazy eights, and so on. Your job as an instructor is to isolate the fundamental building blocks of that skill, then have your student practice them repeatedly until they are mastered. Your students are sure to appreciate their accelerated rate of learning and the reduced cost of flight training. You might say they will get a kick out of it, but not that kind of kick. Heeyaw!

The CFI's Golden Rule

By Rod Machado

There's an old saying that goes, *" Nothing succeeds like success"*. Success is a powerful student motivator. It keeps students interested in their training and gives them hope that they'll eventually be able to earn a private pilot certificate. It also helps overcome the doldrums that often follow those unwelcome learning plateaus. Understanding the need for success and how to dispense it is an important part of your job. Always keep in mind the Golden Rule of flight instruction, which is to *never let a student get out of the airplane unless they've experienced some form of success.*

Begin every lesson by setting one or more goals for the student during that training session. When the goal is achieved, immediately acknowledge and reinforce the success. By *acknowledging* the accomplishment ("Lucy, you did that just the way I had in mind") the student knows you know, and knows that it *is* possible to reach the goals you set. Then, *praise.* This is no time to be stingy with your praise. Give it up. Tell the student that you're happy with his or her accomplishment. Stand up and applaud (watch your head on that headliner). Then, make sure you reinforce the success at least one more time during the student's postflight briefing. This sequence is very important. One of the most frequent complaints I hear about instructors from students is that their CFI is "never satisfied." Indeed, some CFIs do inadvertently keep raising the bar without acknowledging success. This is a morale buster.

What happens when learning difficulties or unplanned events prevent the student from achieving the identified goal? Here is where CFIs demonstrate the skill for which they earn big wampum. As a creative flight instructor, you must find some success within the failure. If the whole goal wasn't reached, find the portion of it that was executed well. Break the task down, and say what went right as well as what went wrong.

There's no need to be facetious, either. In other words, don't look over at a student who has nearly resurfaced the runway with a dipped wingtip and quip, "Well Bob, that was an excellent demonstration of crosswind landing technique! It's just too bad there was no crosswind at the time." It's preferable to say, "Well Bob, keeping the wings level during landing is still a challenge for you but I was impressed with your ability to keep the longitudinal axis aligned with the runway centerline."

Keeping students feeling good about their progress is an extremely important part of your job. Good instructors recognize the need to keep their students movitated. Begin by choreographing each lesson to

ensure that your students achieve some form of success. Remember to acknowledge and reinforce that success when it occurs, and remind the student about it as he or she departs the airport with a smile and the desire to return and learn.

Stick and Rudder Evaluation Tool

By Rod Machado

What if I could show you a single technique that can be used to quickly evaluate the stick and rudder skills of an applicant for a flight review? Would that help you? It has helped me evaluate the skills of the pilots I've flown with over the years. I consider it the single most important tool I keep in my mental CFI flight bag.

Here's how it works.

While in straight and level flight, ask your student to enter slow flight at minimum controllable airspeed (MCA) while maintaining straight and level flight (stall horn or light on, or stall buffet barely detectable). Your student's ability to maintain his or her heading, altitude and attitude while keeping the airplane coordinated is a direct reflection of his stick and rudder proficiency.

I have yet to find a pilot with poor stick-and-rudder proficiency who can perform this task *quickly* and *precisely*. But I've certainly come across more than a fair share of pilots who were frustrated by the exercise. They either failed to maintain their heading and/or altitude, failed to act assertively with the power when entering the region of reversed command, faied to actually maintain MCA, failed to prevent stalling the airplane or failed to enter slow flight in a timely manner (meaning that they take most of the day to do it). Sometimes they failed to do all these things.

A good stick and rudder pilot, on the other hand, can quickly enter and exit slow flight, all the while keeping the altimeter, heading and inclinometer indications frozen in place.

Attempting to restrict an airplane's motion is a difficult task, which makes slow flight a powerful means for evaluating stick and rudder skills. Years ago a friend took an evaluation flight with the late, great, aerobatic legend Art Scholl. The first maneuver Art asked to see was straight and level flight. When my friend's heading deviated by two degrees, Art said, "Well, we have some work to do."

Variable Rate Descents for Student Pilots

By Rod Machado

When students begin landing practice, they'll typically need to acquire two additional skills beyond the basic fundamentals they've already learned. One is the obvious skill at flaring the airplane, the other is the less obvious skill at making *variable rate* descents. Let me explain the latter.

When I introduce students to landing, I begin with power-off approaches. At the appropriate point in the pattern, I'll have them reduce power to flight idle for a successful glide to the runway. This strategy helps students develop a sense of the airplane's glide potential early in their training. Invariably, however, there comes a time when they'll be too low and need power to reach the runway. This requires skill at variable rate descents. It's also something that many instructors don't teach prior to landing practice, which makes learning to land much more challenging for the student.

During the first few hours of flight training, I'll have my students practice power-off descents at 1.3 Vs (final approach speed) by reducing the throttle to flight idle. Next, I'll have them practice modifying the descent by moving the throttle from one *fixed power* position to another in increments of 200 RPM (these are simple, quick and easy adjustments to make). No, I'm not interested in having them maintain a specific descent rate. I'm only interested in having them acquire the reflex at modifying engine power in small increments followed by a simultaneous elevator adjustment to maintain their approach speed.

Changing power in 200 RPM increments makes power modification and airspeed control a very simple skill that can be acquired with minutes of practice. It allows them to easily modify their glidepath without

concentrating too much on throttle manipulation. With this skill in hand, students have more time to focus on the landing flare, the one additional skill they needed to land and airplane.

Lesson-4

Stall Simulation

By Rod Machado

One objective of stall training is to provide a realistic setting in which the stall might actually occur. That means providing a distraction that leads the student to stall the airplane without his or her anticipation of doing so.

Over the years I've had great success with the following stall simulation. It's best used only after the student understands the basics of stall recovery, and when he or she isn't expecting to actually practice stalls. Here's how it works.

When operating at a safe altitude, have your student begin a straight, no flap, power off descent at his normal final approach speed. Shortly thereafter, ask your student to maintain an upcoming altitude (pick any reasonable, safe altitude) for 30 seconds with the elevator control and without using power. As the altitude is approached, the student will begin pulling back on the elevator control. Just before the stall horn activates, ask your student to enter a right 25-degree bank turn (this requires a little more concentration than a 20 or 30 degree bank turn). At this point the student is focused on the clock, altimeter and attitude indicator. Can you guess what will happen?

The airplane will stall and completely surprise your student. Often, there's a rather long delay before the stall recovery is implemented. On several occasions, I've actually had to remind my student that they were in a stall before they actually lowered the nose and applied power for recovery.

Your objective isn't to scare the student. Instead, it's to show how stalls occur in a real life conditions. Pilots seldom expect to stall their airplanes, and when they do they often delay beginning a recovery because they don't recognize they're actually stalling. This is an excellent technique to add to your repertoire of flight training tools.

State-Dependent Learning

By Rod Machado

It was early in the 1970s during my initial CFI checkride when the accompanying FAA inspector asked for a departure stall demonstration. I obliged. Just as the stall was about to break, the inspector twirled his mustache then sneakily pushed the left rudder pedal to the floor. The airplane went over on its back and began to spin. What happened next was my first experience at how our training sometimes fails us.

In a mental fog of my own making, I sat motionless, doing nothing, as if I were a little pilot-Gandhi protesting some great issue. After one full rotation it hit me. Spin! I recovered from the spin but remained nonplussed at my inability to recognize what had just happened to me.

My experience can be traced to a theory in psychology known as *state-dependent learning*. The theory posits that we retrieve memories more effectively when we are in the same state of consciousness that existed when those memories were formed.

For instance, suppose you learn something while under the influence of caffeine. This theory suggests that you'll be more likely to recall that information after consuming caffeine. If you forgo the doppio and take a test on the material, you might come off as a real dopey-o.

When molecules flowing through our veins (i.e., caffeine, alcohol, adrenaline, etc.) change our state of consciousness, they also change the way our neural pathways code memories. To have immediate and full access those memories, we need to return to that same mental state.

For instance, suppose you learn stall/spin recovery techniques in a relatively relaxed mental state. Now release adrenaline into your veins by having Ned the Fed shock you by unexpectedly placing the airplane into a spin. You're now in a highly aroused emotional state (who wouldn't be?), which makes access to your stall/spin recovery memories (skills) less efficient.

As a flight instructor, you probably see the contradiction this theory presents when training student pilots. On one hand, you want to keep the anxiety level low during stall practice. On the other, if your students learn spin recovery behavior in this emotional state, they might be less likely to behave properly when they *unexpectedly* stall or spin an airplane (a different state of consciousness). What's a CFI to do?

My suggestion is to purposely and responsibly incorporate a higher state of arousal in the *latter part* of a student's stall/spin training (do this after the student has learned the basics of stall recovery). You can do this by using a technique known as *induced arousal*.

One way to induce arousal is to climb to 3,000 feet AGL, then have your student begin a power-off descent to 2,000 feet AGL (or whatever altitude you feel is safe and appropriate here). Inform him or her that, upon reaching 2,000 feet, he is to level off and hold altitude for 30 seconds using the elevator only, and no power.

Whenever I ask a student to do this, she invariably focuses on the clock and altimeter to the exclusion of the stall horn and the assorted pre-stall warning clues. When she stalls, she'll do so in a slightly higher state of arousal than she's used to—but not so high a state that she's likely to be frightened. The most common response produced by this demonstration is a nearly immobile student, one who sits there holding the yoke aft while the airplane performs a few falling-leaf type stalls. On occasion it's necessary to say, "You're in a stall. Recover!" It only takes one or two of these demonstrations to broaden the emotional range of your student's stall recovery behavior if and when a stall occurs in the real world.

There are many other ways to induce arousal without scaring your students (please don't scare your students). For instance, have your student begin a steep turn at 45 degrees of bank and change the direction of turn every 15 seconds. Start this maneuver at 10 knots above the stall speed for 45 degrees of bank. Instruct him to reduce power by 100 rpm every time they change the direction of turn. The idea is to distract him so that he doesn't pay attention to the stall clues he'd typically recognize under non-aroused conditions. If you set this up properly, your student won't see the stall coming. Let his post stall response (or lack of it) play out as long as necessary for him to see how he behaves in his current emotional state. You're only limited by your imagination when it comes to creating induced arousal. Just to be clear here, you want to arouse your students, not scare them.

Is the theory of state dependent learning something we implement into our student training strategies? You bet it is. Years ago NASA did a study suggesting that in 75% of the stall/spin accidents where the pilot survived, he didn't recall hearing the stall horn. It's reasonable to posit that the pilot's state of consciousness at the time of the stall (think adrenaline rush here) might have diminished his full and immediate access to his stall recovery memories—memories possibly learned under less aroused conditions.

Reveal The Hidden Value

By Rod Machado

When you ask an experienced martial artist if he has ever used his martial arts training, don't be surprised if he says, "I use it every day." He's not talking about kung-fuing intruders or bad drivers. He's speaking about how he uses the hidden value of his training—self-discipline and awareness—in his daily life. It turns out that most of the basic flight maneuvers students are required to learn also have hidden values that are typically not discussed in any FAA handbook. Your job is to make sure your student sees and understands those hidden values.

Take, for instance, steep turns. Yes, the FAA says that the objective of the steep turn is to "...develop the smoothness, coordination, division of attention and control techniques necessary for the execution of maximum performance turns when the airplane is near its performance limits." OK, fine. There's nothing wrong with that. But it doesn't speak to the essential value offered by studying this maneuver.

Steep turns teach you what happens when the stall speed rises to meet the airplane, instead of the airplane slowing to meet the stall speed. Stall recognition is as important as stall recovery, and the steep turn provides students with an extended exposure to the clues that precede an accelerated stall. I'm speaking of the large rearward draw on the elevator, higher stick forces and the sustained sense of being forced down in the seat by an increase in load factor. Steep turns performed with the throttle at flight idle allow you to demonstrate how easy it is to approach the critical angle of attack with the nose pointed below the horizon. The steep turn is one of the few non-aerobatic maneuvers that provide experience with these pre-accelerated-stall clues.

Turns around a point is another maneuver with a hidden value not often recognized by student pilots. This maneuver allows your student to make a highly accurate assessment of wind direction without using any sort of ground wind indicator (i.e., wind sock, wind tee, blowing trees, wave crests, smoke, etc.). Students are able to evaluate the wind's direction as they maneuver to maintain a constant turn radius about a ground reference. What we often fail to point out is that the airplane continues to fly perfectly without stalling while turning from upwind to downwind to upwind and so on.

It turns out that more than a few pilots believe that turning downwind (especially in strong winds) results in the airplane experiencing a loss of airspeed and stalling. Yes, an airplane can stall when turning downwind in the presence of massive *negative* wind shear or if the pilot interprets an increase in ground speed with a sudden rapid descent (followed by an aft pull on the elevator that results in a stall). Airplanes, however, don't stall *because* they turn downwind. Turns around a point is the perfect demonstration for disabusing students of the idea that an airplane can somehow sense the wind's speed and direction once it leaves the ground.

Flight at minimum controllable airspeed (MCA) is another maneuver whose hidden value helps students understand how power influences stall speed. You can demonstrate this by having your student enter MCA with the stall horn just barely audible. Then instruct her to reduce power while maintaining the same attitude. She should hear the stall horn instantly whine louder. This demonstrates that the airplane can fly at a slightly slower *airspeed* before stalling with power applied than with power off.

Even straight and level flight has a hidden value that often goes unmentioned by instructors. It's the perfect maneuver for demonstrating how deviating from straight flight reduces the vertical component of lift, resulting in the airplane pitching nose down. For example, place your student in straight and level flight and trim for that condition. Now have him or her apply just enough rudder to bank the airplane to the right about five degrees. The results are immediate and clear. As the vertical component of lift tilts sideways, less of it acts vertically. Weight is now greater than lift and the airplane pitches nose down in an attempt to balance these two opposing forces. Roll the airplane back to straight flight, and the airplane eventually returns to level flight as the force of lift once again acts entirely vertically. This is the hidden value of straight and level flight that allows you to accelerate your student's understanding of the need to apply elevator back pressure when entering a turn.

Not everything is as it seems to be. Sometimes, it's more. This is especially true of the maneuvers we teach our primary students. There are hidden values in nearly all elementary flight maneuvers and it's the instructor's job to identify them and share these with his or her flight students.

Audio Recorders: A Student's Best Friend

By Rod Machado

Does your student have trouble remembering from one lesson to the next? If neither motivation nor oxygen deficiency is the problem, why not try making an audio recording each lesson?

Encourage your students to bring their audio recording device and a sufficient supply of memory cards to each training session. Have them record the pre- and postflight briefings for review at a convenient time. Audio recording makes it easier for students to retain the essential parts of every lesson, which also makes your job a lot easier.

When possible, also have them record the in-flight portion of each lesson. This works best when they're able to tap directly into the intercom system. Unfortunately, using an *open mike* in the cockpit instead of a *direct connection* makes for recordings that sound like a busy Hong Kong street corner. Some portable

intercom systems have a separate jack for direct connection recordings. Few airplane intercom systems have an extra jack for audio recordings. More often than not, students need to create their own jack-connection.

A trip to any electronics store usually solves the problem. Find the most senior salesman with a Don King type hairdo. This is a sure sign that this fellow has worked with electricity. He'll help you find the proper jacks necessary to ensure a good recording.

Recently, a student sent me copies of all his private pilot lessons that we recorded several years ago. He thanked me for encouraging him to record these lessons, stating that they were even more valuable now that he's a flight instructor. Listening to his own lessons and his struggle to understand certain topics made him a more empathetic teacher. He's a better instructor for it.

Audio recorders also allow students to adapt to an air traffic controller's rapid-fire speech rate. Psychologists tell us that we can learn to understand speech spoken at a rate ten times faster than normal conversation with a 40% distortion of the transmission. To a student, that's exactly what comes out of most air traffic control towers. Exposure to ATC's speech rate is the key to comprehending what's being said.

Have your students make recordings of all their communications with the tower and approach control. After reviewing these often enough, they'll begin to understand the words, the patterns and the appropriate responses. After 60 minute of listening to rapid fire communications, most student begin to acclimate to ATC's speaking style.

Till then, happy recording.

Dividing Attention Q&A

By Rod Machado

Question

Dear Rod,

I'm having a very tough time trying to divide my attention between looking outside and inside during ground reference maneuvers, specifically turns around a point.

Thank you,

Confused Tina

Answer

Greetings Tina,

You've correctly identified one of the most important skills needed to perform ground reference maneuvers. It's called "dividing your attention" between the outside and inside of the airplane. This skill requires behavioral development in two areas: knowing where to focus your attention and how long to focus it. Let's examine the latter first.

Anytime you look outside the cockpit, you're performing some type of ground reference maneuver, even if it's only looking at a distant horizon. The recommended ratio of outside to inside viewing is 14 seconds outside to three seconds inside. That works for turns around a point, too.

Knowing what to look at inside the cockpit is another issue. When performing turns around a point, you certainly don't want to focus on the attitude indicator when looking inside the cockpit. Your wing and the ground reference tell you what you initially need to know about the bank angle. It's your "altitude" that's difficult to evaluate when looking outside. So when you look at your panel, check the altimeter first and make a pitch change, if necessary, to maintain the desired altitude. Once you gain a little practice, you can look at any other panel instrument that pleases you, even the Hobbs meter (which seldom pleases student pilots).

The Power of Simulators

By Rod Machado

Over a period of two semesters, a young college student with two demo flights in his logbook acquired approximately 60 hours of supervised training using a desktop flight simulator. Curious to test his chops at the controls of a real airplane, this student signed up for another demo flight at the end of the second semester. Instead of riding along passively, he asked the accompanying flight instructor to let him do everything—and I mean everything—including talking with ATC, taxiing, flying, etc. The instructor reluctantly agreed.

The result? With less than two hours of actual flight time, the student handled the airplane and ATC with ease. The instructor touched nothing, much to his surprise.

Airport fiction? Nope. It's all true.

This student was lucky enough to spend two semesters in Ed Valdez's flight simulator class at Cypress College in Southern California. Ed is the assistant professor of aviation at Cypress and an uber–simulator fan who leverages these devices to reinforce and accelerate his student's acquisition of flight skills.

Ed's simulator platforms use traditional desktop computers running Microsoft Flight Simulator X (or Elite) and a program known as PilotEdge to provide real-time ATC communication. Several of Ed's simulators have large TV monitors that enhance the simulation experience (shown below). My favorite one consists of three supersized TV monitors arranged in the shape of a small cubicle (it's a mini IMAX machine). A traditional computer screen sits slightly below the front main screen and displays the basic analog (not glass) flight instruments.

When a student sits down to take the controls, he or she can see the bottom of each wing through the right or left (large) simulated window. This allows the student to directly evaluate the wing's in-flight angle of attack, a necessary component to learning stick and rudder skills. The surrounding terrain is also observable through each large window. This means the instructor can teach the basic concepts of attitude flying, ground reference maneuvers, pilotage, dead reckoning navigation, and pretty much anything else required for private pilot certification.

Additionally, the large monitor in front of the student allows him or her to evaluate his height above the runway during landing. This is possible because the runway can still be seen at the bottom left side of the instrument panel and cowling during the flare. After all, this is where students should look if they want to evaluate their height above the runway.

Of course, none of this would be possible without the guidance of a highly skilled instructor such as Ed Valdez, who uses a practical flight syllabus (created by Ralph Butcher at www.skyroamers.com).

One of the secrets to Ed's success (and there are many) is that he requires his students to have three to four hours of simulator time for every hour of dual instruction they obtain. He also avoids using glass cockpits for primary training since this has little to do with learning to fly an airplane.

When I visited Ed at Cypress College in mid-October, I met one of his students, Rio, who had 39 hours of Cessna 172 flight time and was ready for his private pilot check ride. Rio had acquired about 30 hours of supervised sim time over a period of several months. According to Rio, Ed's simulator training program will shave nearly $4,500 off the cost of a private pilot certificate earned at a traditional flight school.

Airport fiction? Nope. Just good simulation software, large monitors, an effective syllabus, good management, and exceptional teaching skill that help students earn their pilot certificates in less time and with less money.

If you or your flight school operates on a budget (and who doesn't?), then consider using Ed's flight simulation strategy. Start by acquiring a few large screen TVs for way under $1,000 each (and they certainly don't have to be as big as the ones you see here), a desktop computer with a good CPU, and one or two good video cards. Build the "Big Bertha" of flight simulators and obtain a good syllabus to aid in your training. Now you're on your way to replicating the success that Ed has experienced with his students at Cypress.

Lesson-5

Perceptual Magic

By Rod Machado

When David Copperfield made a Learjet disappear from an airport tarmac in the 1980s, his audience was stunned. They had the same expression on their faces that an airplane owner has when he forgets a monthly loan payment and the repo man makes his Learjet disappear.

The fact that magic surprises us shouldn't surprise us at all. It affects us this way because the magician does exactly the opposite of what the educator does. He uses misdirection to keep us from properly identifying and recognizing the physical sensations that come our way. We call these sensations *perceptions.* Without them, we're unlikely to understand what we're experiencing.

Effective flight instructors help their students recognize and understand what they're seeing. For instance, a fundamental concept of military sniper training is that *you become better at seeing what you become better at seeing*. Practice looking for out-of-the-ordinary items (think gun barrel in a tree), or inappropriate patterns in the field (think helmet on grass), and you eventually become better at finding these things. This simplest form of perceptual training is ultimately quite effective. Put this principle to use in the cockpit by helping your students better identify what they're perceiving.

We typically introduce students to flying coordinated by having them look at the ball in the inclinometer. Then we might mention that a right- or left-deflected ball is accompanied by a simultaneous right or left weight displacement (respectively) on their built-in seat cushion. Then we move to the next item in the syllabus, happily satisfied that we've taught our student something useful. In fact, it's doubtful we've taught our students much at all.

The next time you demonstrate flight control coordination, try using the following five perceptual modifiers to help your students perceive properly: *isolate, identify, exaggerate, eliminate* and *compare*. Let's use these concepts to introduce seat-of-the-pants flying skills.

By *isolating* sensory stimulation, you allow your students to better recognize it. When demonstrating the postural feeling associated with a slip or skid, place the airplane in a slipping or skidding turn and keep it there. Point out the relationship between the inclinometer's deflected ball (a visual perception) and the feeling in the seat of their pants (a tactile perception). Give the student time to recognize and experience these distinct sensations.

Next, help your students *identify* exactly what it is they're experiencing. You can't fly coordinated by the seat of your pants if you don't recognize the g-load in your pants has shifted to one side. Be careful how you phrase this, but say something such as, "Do you notice how the load on your rear end has shifted to the right (or left) side of your *derriere?*" This may require some translation if your student doesn't speak French.

Sometimes it's necessary to *exaggerate* sensory stimulation to properly recognize it. For any potential stimulation to be experienced by an individual, it must exceed his or her *sensory activation threshold* for that stimulus. Some people just can't feel a *slight* slip or skid. But they can feel it if you place the airplane in an *extreme* slip or skid and leave it there. Now, the stimulation is more likely to be perceived.

Here is where you can take your teaching skills to the next level. To better ensure that your students recognize and understand what it is that they're perceiving, *eliminate* everything you can that distracts from that process. Once again, we're doing exactly the opposite of what the magician does. We're eliminating distractions, not using them.

Have your students temporarily cover their eyes with both hands while you fly, then begin a turn and purposely slip or skid the airplane. By eliminating visual information, you're shutting down one channel of input and letting the student's brain use more resources to process the relevant channel. Of course, you'll want to make sure that your students don't think that all coordinated turns are to be made with their hands covering their eyes. I have a feeling that this would cause a problem on the private pilot checkride.

Finally, you want to explore the full range of available sensory stimulation by helping your students *compare* newer stimulation (new perceptions) with either its polar opposite or its absence. The postural

feelings associated with a right slip (or skid) are made more recognizable when immediately compared to a left slip or skid of the same magnitude (its polar opposite). If you're practicing slow flight, the distinct feelings of the flight controls in this condition are more recognizable when compared to normal flight (the absence of mushy controls).

All learning begins with perception. By helping your students isolate, identify, exaggerate, eliminate and compare the individual elements of their experience, you'll help them learn faster and much more thoroughly.

Self-Talk Dialogues

By Rod Machado

If you've ever rented an automobile in a foreign country where they drive on the opposite side of the road, you know how challenging it is stay in the proper lane. Yet you somehow managed to do it (hopefully), and not simply by luck, either. You probably used some type of self-talk behavior modification scheme to coax you into behaving properly, at least until your driving behavior became automatic or habitual.

Perhaps you kept telling yourself, "Stay to the left, stay to the left." This might have been easy to do since those were the same words your passengers were screaming at you. In my case, I kept repeating the following phrase to myself, "My left leg is a magnet attracting the left curb." This strategy worked fine for me, but I did avoid all refrigerator doors for fear of becoming stuck to one.

These are simple self-talk behavior modification strategies and we use them all the time. Good flight instructors should use them too. They are probably one of the most effective means of accelerating the rate at which flight students acquire new skills. They're especially useful when students are overwhelmed by complex cockpit behaviors. If the self-talk cues are repeated often enough, the behaviors they inspire will likely become permanent.

To be most effective, the repeating should initially be out loud, especially for pilots in training. There's something about saying that makes stuff stick. Gradually, the student internalizes the cues and uses his or her inner voice.

You most likely use a number of self-talkers already. How about GUMP (gas, undercarriage, mixture, prop), which helps you configure the airplane for landing. *OSUN* (overshoot south, undershoot north) help when making compass turns. *Aviate, navigate, communicate* helps remind pilots of the proper priorities when flying an airplane. Similar strategies are available for developing and reinforcing more complex behaviors, too.

One of my favorite self-talk cues for students over the years has been, *Where am I going? How do I get there? What do I do next?* I can't think of a more powerful self-talk behavior modifier for helping students keep their brain ahead of the plane during cross country navigation or when being vectored for an instrument approach.

During the first part of a cross country flight, I'll have my students repeat these questions to themselves at five minute intervals, and do so more frequently when the destination airport is in sight. To prime the students' behavior, I'll hold three fingers up during the first part of the flight to remind them to ask these questions. Thereafter, I'll occasionally display three fingers to reinforce the behavior. With sufficient reinforcement, students will soon be asking these questions automatically.

For instrument students I add an additional set of self-talk questions to use when they intercept the instrument approach course. *How low? How long? Which way?* If I can get them to ask these questions during the approach, it's unlikely they'll descend through an MDA or drift off into some forbidden area outside of the instrument approach envelope.

What about prodding students to behave properly during an in-flight emergency? While there's probably a good checklist to use in this instance, I like to supplement this with the following self-talk cue. This sequence of questions has proved to be extremely valuable in guiding the students' behavior in these circumstances: *What do I need to do? How do I do it? Is this working? What do I do next?*

Then there are the times when you have to customize a set of self-talk questions to assist a student in overcoming a particular problem. Here is where a bit of creativity is useful, especially when the task involves complex behaviors.

One of my older students was initially overwhelmed by the steps needed to configure the airplane in the pattern for landing. I needed a self-talk sequence to help build this behavior. This is the sequence I developed for him. I had him memorize the following three lines of self-talk:

1. *Down beam 10 80 TPA*

2. Threshold tail wing base idle 70

3. Final 65

These cues provoke the following behaviors in my student. When *downwind abeam* threshold, add *10* degrees flaps, slow to *80* knots, remain at *traffic pattern altitude*. When the *threshold* is between the *tail* and *wing*, turn *base*, reduce power to *idle*, fly *70* knots. When turning *final*, fly *65* knots.

I had my student memorize (by rote) the sequence the night before his next scheduled lesson. On the next flight, he verbally cued himself to perform the proper behavior at the proper time in the pattern. Before long, these self-talk cues will reinforce the desired behavior, rendering it habitual instead of artificially produced.

There is no behavior—be it motor, perceptual or cognitive—that can't be developed more rapidly, thoroughly and efficiently by using self-talk cues. None! On the other hand, the more complex the self-talk cue the student is required to learn, the bigger the payoff must be in terms of the behavior it inspires.

So talk it over with yourself and devise self-talk cues to help your students learn to fly more efficiently. I'm sure you can think of many that will be helpful. In the meantime, I'll be repeating to myself, "Stay away from the refrigerator door. Stay away from the refrigerator door."

Lesson-6

Talk, Talk and More Talk

By Rod Machado

One of the most experienced flight instructors I know recently conducted a flight training experiment on pre-solo students. During a summer camp for young pilots (who are given flight training up to solo), he and his fellow instructors taught with and without headsets. The training was conducted in taildraggers at a small, non-tower airport. What did he discover? Students trained without using headsets typically soloed in 20-30% less time than those using headsets. If I were to posit a theory for these results, I might suggest that the ease with which headsets allow instructors to engage in unnecessary chat diminishes a student's ability to learn efficiently.

Without the use of headsets, the instructor must expend some physical effort to communicate a point. That means either leaning forward to speak or leaning forward to point to something, poke something or even flex and shape a hand to mimic the behavior of an airplane. As a result, instructors might be inclined to communicate more efficiently compared to how they communicate when using headsets. The result is that the student is less likely to be distracted by an instructor's unnecessary chatter and more likely to rely on his or her self to solve a problem.

Now, I'm not saying that we shouldn't use headsets during flight training and I'm certainly not giving up mine. We should, however, consider talking only when it serves a useful purpose. Ultimately, we have to let students make mistakes in an airplane if we want them to learn efficiently. After all, sitting there in silent mode when a student has failed to reduce power on final approach is one of the hardest things an instructor must do, especially when it's so easy to whisper a hint like, "Shall I call NASA for an orbital clearance?" So think about talking less so your students can learn more.

Too Much Help

By Rod Machado

Despite your good intentions, it's possible that you can be overly helpful with students, and in doing so deprive them of a valuable learning experience.

Recently, a student told me that his instructor always kept his hands on the controls during the landing flare. This student had five hours of landing practice and was never quite sure if he ever actually landed the airplane by himself during that time. My guess was that the student was capable of landing and the instructor wasn't fearful of his student's response during the flare. More likely, this was a case of the CFI wanting to be too helpful. Unfortunately, despite the CFIs good intentions, his student is the one who suffers.

It's important for CFIs to realize that students need to make mistakes in order to learn. Human beings are self-correcting learning devices. We see the result of a previous action (a mistake) and profit from this by adjusting our behavior as a result. This is called *feedback* and it comes primarily from making mistakes. If students can't see the results of their errors, then they simply won't learn as efficiently. So, explain a maneuver to your students, demonstrate it, then let them try it themselves. Intervene only when it's necessary to make a point, prevent an unsafe situation, or avoid an unpleasant meeting with the ground.

I suspect that some CFIs are overly helpful because they don't know how to handle a student's failure during their first few attempts at learning a new behavior. Instead of embracing a mistake as an opportunity to teach, these instructors prevent the mistake by offering too much assistance. Perhaps these same CFIs even consider a student's failure to do a maneuver properly the first time to be a reflection on their ability to teach. Either way, overly helpful behavior with students could be symptomatic of some deeper drive to protect our self-image. It's worth monitoring ourselves in these instances to get a better feel for the motivations that may be driving us on an unconscious level.

If you're an overly helpful CFI, be more willing to let your students make the mistakes that are so necessary in order for them to learn. It's how they learn best.

Stop, Look and Turn

By Rod Machado

So, I'm preparing to give a flight review to the proud owner of a technically advanced airplane with an aquarium sized primary flight display in the panel. Before the flight, I'm guessing that he'll be so fascinated with his avionics that his eyeballs will stay mostly glued to his sexy display at the cost of effectively scanning for traffic. This is why I've learned to offer a preemptive challenge to a student in hopes of helping him or her properly scan for traffic.

Before flying, I'll discuss the need to look in both directions before we turn, and the need to verbally clear the area on the side of the turn. Then I'll inform the student that there's a good chance he or she will do neither during the first couple of turns. Why do I say this? Because I want to challenge him to prove me wrong. Then we let the games begin.

After departure, I'll ask for a turn. In the majority of instances, the student will turn without asking, "Clear right?" or "Clear left?" When they don't ask, I know it's unlikely they're scanning for traffic. So as soon as they begin the turn, I'll grab the controls and return the airplane to level flight, then ask, "What did we forget to do?" Ouch!

It doesn't take long (OK, sometimes it does) for the student to start clearing the area before turning, especially when I keep taking their flight controls away from them (pilots hate that, and I don't blame them). There have been times when I've returned the airplane to level flight during the first half hour of a flight review, much to the chagrin and embarrassment of the pilot. More than a few of my students have said they're now looking outside more often, mainly because they never again want to hear the phrase, "What did we forget to do?"

Trying Something New

By Rod Machado

I recently tried barbecuing cedar planked salmon. This is salmon cooked on a small board of cedar, and it's mighty tasty. Unfortunately, I ran out of cedar planks so I decided to try something new. I can honestly say that I wouldn't recommend the plywood salmon. It just isn't as tasty and the two-by-four salmon isn't much better. In fact, I think they both gave me salmonella.

OK, I jest about the plywood and the salmonella. But trying something new is essential to staying fresh as a flight instructor. For instance, the next time you're teaching someone to land an airplane, ask for permission to have their hand in marrying the airplane to the runway. All right, what I really mean is that I want you to hold onto their left wrist with your left hand (with permission, of course) as they hold onto the control column with their left hand.

Now, instead of moving your controls in demonstrating a landing and having them follow through, you'll move their hand while it's in contact with the control column. All they have to do is promise not to let go of the controls while keeping a soft grip on the unit at the same time. The wonderful part of this demonstration is that both the control movements and pressures involved in landing are now more easily detected by the student. This little technique makes it easier for the student to understand how to land the airplane.

Trying something new in the cockpit to aid in training is something that all instructors should consider. There's no end to what you can come up with if you take the time to be creative about it. And yes, trying something new still applies to cooking, which is why I'm considering pressboard planked salmon for dinner tonight.

Lesson-7

Simulators for Landing Training

By Rod Machado

While PC simulators are obviously limited in their visual presentation by screen size, that doesn't mean they're limited in how they can be used to help students learn and master stabilized approaches to landing.

One of the ways students are taught to recognize whether they're high or low on final approach is by evaluating changing runway geometry. If a student is on a safe, stabilized glidepath that takes him to a specific point on the runway, the runway's trapezoidal shape doesn't change, though the overall trapezoid becomes larger as the plane approaches the runway.

If the glidepath changes, the runway's trapezoidal shape also changes, stretching (elongating) or shrinking (shortening) the trapezoid, depending on whether the airplane is above or below the desired glidepath, respectively. Developing the perceptual skill to assess a runway's changing shape is essential. This is where PC simulators can help.

Begin by creating and saving a flight scenario on the simulation software with the airplane placed on a two mile final and configured for a stabilized approach to landing. Instruct your student to fly several flights at variable power settings while holding a constant airspeed. Have him or her pay close attention to how the runway geometry changes as the glidepath changes.

The objective is to help the student identify when the runway's trapezoidal shape becomes longer or shorter, showing that the plane is above or below the desired glidepath. After only a few practice approaches, the runway's varying shape will be easier to recognize based on variations in glidepath. It won't take long before the student develops the perceptual skill needed to properly evaluate whether he or she in on the appropriate glidepath in the real airplane.

The Runway Alignment Reflex

By Rod Machado

If you're using a flight simulator for student training, you have a powerful tool for teaching what I call *the runway alignment reflex*.

One of the challenges students face involves keeping the airplane properly aligned with the runway during landing. The difficulty begins when one wing lifts, either due to a gust or because of a student's inattention. Students typically apply aileron to level the wings but often fail to compensate for adverse yaw by use of the rudder. With even light wind gusts on final, the airplane often ends up flying a serpentine rather than a stable approach to the runway. If they can't get the runway picture stabilized in their windscreens, it should come as no surprise that students have difficulty correctly gauging their height above the runway for the landing flare.

Here's how to develop a student's runway alignment reflex. Preset the simulator to be at 500 feet on final at approximately ¾ to 1 mile from the runway threshold, at approach speed with power set to flight idle. Activate the wind gust feature to its maximum level but initially keep the wind aligned with the runway and save these settings. Push the button and let the student fly the approach to flare height. Then, reset the sim and let the student practice once again.

The student's objective is to keep the nose perfectly aligned with the runway through the coordinated use of aileron and rudder. If one wing banks, then the student should use aileron to level the wings and rudder pressure to keep the airplane nose straight during the roll. All the while the student is maintaining the necessary nose-down attitude required to maintain the targeted power-off approach speed. Repeat this training until the student can keep the nose aligned with the runway and the attitude adjusted to maintain approach speed.

Unfortunately, the runway alignment reflex often develops as a result of learning to land instead of being a prerequisite for landing practice. Students typically don't develop this reflex in the first few hours of basic training in the practice area because they don't have a relatively close fixed reference (i.e., the runway that expands in their windscreen) by which to measure heading deviation. The simulator is the perfect tool for developing this behavior.

Add this technique to your instructor tool kit and help your students learn to land by developing their runway alignment reflex.

The Eastman Technique

By Rod Machado

I have a friend who doesn't read history. This explains why he thinks that Columbus' three ships were named the Niña, the Pinta and the Julio Iglesias. Hopefully, you enjoy history, especially aviation history. I know I do. That's why I got so excited when a fellow pilot sent me Fred Weick's autobiography titled, *From the Ground Up*. It's a very rare book. He's now my new best friend.

For those who don't know about Fred Weick, he invented the Ercoupe. Reading his autobiography can help you understand the historical lineage of this wonderful little airplane. It can also provide you with useful insights into how people learned to fly in the early 1920s. One flight training narrative in particular caught my attention. In it, Fred Weick described how his friend, Jacobs Eastman, taught himself to fly a single-place homebuilt airplane—a taildragger, no less.

Having no prior flight experience, Eastman began his self-taught solo program by asking Fred about the techniques needed to handle a taildragger on the ground. After several discussions, Eastman began his cockpit training with taxi sorties at increasing speeds along a grass runway. Weick stated, "After he got the feel of the plane, he taxied faster and then a little faster until, during a full-throttle run, he took it off for just a foot or two and landed, all within the 1,200-foot run."

Here's how Weick described Eastman's official solo: "In succeeding days, Jacobs made several short runs like this, each time talking over with me what happened at the end of each run. Finally, late one afternoon, he went out by himself and made his solo flight."

Of course Eastman wasn't the first person to solo himself in an airplane. While uncommon, this wasn't the rarest occurrence back in the early 1920s. After all, he was flying a single-place airplane, and instructors don't fit in shirt pockets.

Just to be clear here, I'm not advocating that students teach themselves how to fly. (Yes, I know that would make flight training less stressful on the instructor, especially as he would not be there for the actual solo.) Instead, I'm peddling the value of the *Eastman* technique (the name I gave it) as a means of helping your students learn to land an airplane.

Think about it this way: In order to land, students need to overcome the ground shyness inspired by the expansion of a planet-sized object (planet Earth) in their windscreen as they approach the runway. Through a series of successive approaches and landings, they can eventually control their shyness and prefect the landing flare. We might call this "top-down" learning.

On the other hand, the Eastman technique allows students to overcome runway shyness from the "bottom up" by remaining close to the ground as they acquire landing skills. This is accomplished by moving along the runway at rising increments of speed. Once students feel comfortable with high-speed ground runs, they can lift off the runway for a foot or two then reduce power and settle back on the solid surface. The beauty of this technique is that it allows students to touch down with the same control, feel and response they experienced on takeoff a few seconds earlier (the same control pressure is still resident in short-term memory). They only need to reduce power and slightly adjust the pressure they're applying on the yoke to make the airplane land. Students can repeat these accelerate, liftoff and touchdown sorties until they feel they can safely leave the runway for an extended solo flight.

The point here is that the Eastman technique helps students learn to land without experiencing the relatively large and rapid change in elevator control pressure associated with the traditional roundout and landing flare. It also gives them more experience in the attitude and speed regime used to flare an airplane. Keep in mind that a single trip around the pattern takes about 10 minutes. During a single pattern circuit, students spend about 10 seconds in the landing flare. Do the math. Ten touch-and-goes in one hour only give your students 100 seconds of experience at flaring an airplane for landing. The Eastman technique increases your students' experience in the flare environment and helps them develop the proper sight picture and flare technique for landing. Once students have this initial experience, they adapt more easily to the traditional techniques involved in landing an airplane from the top down.

Of course you'll want to use this technique after your students have mastered the basic fundamentals of flight. Try it during non-busy hours at a tower-controlled field where the controller might allow you to use the full length of the runway in both directions for taxi runs and limited liftoffs. Use your brain here to customize the technique to the airplane, the student and the parameters necessary for flight safety.

Older Students and Landing Troubles

Copyright by Rod Machado

Everybody ages. We're reminded of this every year as we count the candles on our birthday cake. Then one day, we discover that we can't have a birthday cake because the city won't issue us a fire permit. Age affects everyone, and it's particularly relevant to the challenges that older students face at learning to land an airplane.

Several years ago, I spoke to flight instructors at a major aviation university. These were younger folks in their early twenties. When I asked them about where they told their students to direct their vision during the landing flare, nearly all said they had them look directly over the airplane's nose. Then I asked how it's possible for a student to see the runway when the engine cowling blocks its view during the flare (as it does with most airplanes). Nearly all responded by saying they instructed their students to look at the horizon line to the left of the cowling and use their peripheral vision to gauge their height above the runway.

Does this viewing strategy work? It works quite well if you're a 20-year-old flight instructor who already knows how to flare an airplane for landing. This is the landing strategy that experienced pilots with good vision often use for flaring an airplane. It's not, however, the best strategy for introducing someone to the landing flare, especially older students or older pilots returning to flying from a long hiatus.

As we age, we don't see as well. Less light enters the eyes, we have more difficulty focusing on any object, and our peripheral vision diminishes. It's the last item that's particularly relevant when training older students and older pilots.

If older students are taught to rely on peripheral vision to flare the airplane, then they'll have difficulty sensing their height above the ground, especially if they wear corrective lenses. Think about it. You have to look through the lens for vision correction. Peripheral vision occurs primarily beyond the frame that holds the lens. Depending on the type of vision correction applied, the student might have very little visual acuity in his peripheral field. If you'd like to add salt to this wound, allow a student to wear polarized sunglasses (corrective or not) during landing practice. This further reduces the information (light) that enters the student's eyes. Remember, the purpose of polarization is to limit incoming light to that aligned primarily in the vertical plane while reducing that in the horizontal plane. Less light is less information, resulting in less accurate landing flares.

So where should a student look (especially older students or older pilots) to properly flare an airplane? When the nose rises for the landing flare, the only area where the runway and horizon line can be clearly and consistently seen is to the left of the engine cowling. Direct your student's vision to this area as soon as the runway ahead disappears beneath the cowling. Instruct your student to look at the spot on the runway to the left of the centerline, 50 to 80 feet ahead, that appears neither blurry nor motionless. I call this the *sweet spot* because it allows older students (or students of any age) to properly gauge their height above the runway. Sweet.

As the airplane decelerates, the sweet spot will move closer and closer to the airplane. To keep this spot in sight, your student should shift his or her focal point on the runway closer and closer to the airplane until touchdown occurs.

This technique is useful not only for older students learning to land but also for older certificated pilots who've lost their landing finesse. Over the years, I've heard older pilots confess that they can't land as well as they used to, even if they're wearing corrective lenses. One reason for this lack of finesse is that they're still relying on the technique of using peripheral vision to land without the benefit of having their youthful peripheral vision. Once they begin using the sweet spot method to evaluate their height above the runway, their landing problems often disappear.

If you're an instructor, please keep in mind that the techniques you use to land an airplane might be a bit too advanced or physically inappropriate for older students and older pilots. The sweet spot method works for pilots of any age. Give it a try. While aging has it benefits, an increase in peripheral vision isn't one of them.

Lesson-8

Teaching Go Arounds

By Rod Machado

Each of us knows the importance of performing go arounds properly. That's why we ensure that our students are skilled at performing this maneuver. The closer your student is to landing, the more challenging and critical the go around becomes.

The next time you're thinking about asking your student to perform another go around for practice, do so at the time when the student is least likely to expect it—during the roundout or landing flare. It's at this point that the airplane has slipped into the region of reverse command, and performance is dramatically punished if the airplane isn't handled precisely.

Asking for a go around from this position helps you in several ways. It allows you to examine the weaknesses in your student's piloting technique. For instance, you might see your student apply power and attempt to raise the flaps all at once, instead of doing so incrementally. Your student will certainly see the results of a poorly performed go around when the airplane fails to accelerate properly (at least until you help him or her perform the proper technique). There's even a practical side to the maneuver. A Florida pilot once told me that he saw an alligator slither onto the runway as he began the landing flare. A properly performed go around from only a few feet above the ground prevented damage to the airplane and avoided littering the runway with future Gucci bags, belts and luggage.

Performing a go around during the roundout or landing flare is very instructional for your student. There's a lot to be learned by seeing and feeling the differences in a go around from relatively high versus one just off the ground. This is a rich instructional vein for you to mine, and it helps your student gain a feel for the subtleties of flying. Of course, as the CFI, you shouldn't let your student get in a position that places the airplane in danger. The whole point of the exercise—the narrower margin for error—requires that you be at the top alert level, as I know you will be.

Let Them Leave the Nest

By Rod Machado

I remember an instructor many years ago who was so concerned about his student's ability to fly a first solo cross country flight that he followed him in another airplane. He had his student monitor multicom, then took off behind this poor fellow and barked instructions to him all the way to the destination airport. How's that for a radio controlled airplane? I can't imagine that the student felt any significant confidence in his ability, given that his instructor didn't trust him enough to fly solo, solo.

On another occasion, I recall an instructor who would never let a solo student practice stalls in the practice area. It's hard to imagine his students becoming confident about stall recognition and recovery unless those students are willing and able to do the deed on their own.

The point of solo is not to give the instructor a rest from the typical near death experiences an instructor often experiences during training (I jest, of course). Instead, it's to help the student develop confidence. Given that the private license calls for less minimum solo time than it once did, it's now more important than ever to let the student leave the nest without sending a baby monitor along with him. I recently heard of an instructor who requires his students to check with him on the cell phone when arriving at each cross country location. That's a tad extreme, in my book.

If you feel confident enough to let your students take an airplane solo cross country, then at least let them earn the confidence they deserve to earn by doing it alone. Sure, if they need to call or check in, they'll do it. But we diminish a students' developing self-reliance and self-confidence when we don't trust them to make the right decisions on their own.

Measure With the Right Ruler

By Rod Machado

What if you took a class and the instructor told you your grade was an "L." Nothing else. Just "L." Not an "A," "B" or "D," any of which you'd understand, but a garden variety "L." What does it mean?

Frustrating? You bet. Yet we occasionally do something worse to our students.

Think about how you teach landings. You demonstrate a couple of nice landings then have the student give it a go. Wham! Bad landing? In your eyes, not so bad for a first attempt. But the student is using the wrong scale to measure against, because she has only one scale—what you did. Measured with that ruler, the landing was hopelessly bad.

Many years ago a student, in a similar situation, helped me see this problem when he asked, "Mr. Machado, how well do I have to land this thing before you get out?" He had no idea of the *minimum* skill I

required for solo. He certainly knew the skill level required to be a flight instructor because he watched me land. His expectations were driving him to frustration because he was measuring with the wrong ruler.

Problem recognition, unfortunately, is not problem solution. How to provide the right measurement tool? I opted to demonstrate the standards for his *initial* learning target (solo) as well as the standard I expected for the private certificate. In other words, I gave him a new ruler with which to measure both current and future performance.

I did it by making a rather firm landing on the main gear while sparing the nosegear from first contact. Then I commented that even though the landing was firm, it was also satisfactory as long as all similar landings were consistent. If he had 10 great landings and one near disaster, that wasn't OK. Consistency (among other criteria not listed here), not perfection, was my minimum standard for solo. "Once that is achieved," I informed him, "expect me to raise the ante."

Now, don't for one nanosecond think I'm advocating acceptance of a lower overall skill level. I'm not. What I'm saying is that we should simply let the student measure his or her performance by the same ruler *we* are using at any given time. As flight instructors, we don't think "That landing wasn't perfect, compared to what I can do." We think (or should be thinking) "That was pretty good for a student who had 15 lessons." Well, let's tell em'! Share the good news.

Keep one thing in mind: you can't measure the right stuff with the wrong ruler.

Delaying Solo

By Rod Machado

An instructor at a major aviation center recently told me that he likes to delay his students' solos until they've reached about 25 hours of dual flight time. When I asked him why he favored this idea, he said that it helps ensure that his students know more before they fly alone. Huh? Is it possible that we've lost an understanding of the meaning and purpose of the initial solo flight? I'm beginning to think so.

Students solo for one very important reason: it builds their confidence. Solo helps them understand that they're physically and mentally capable of flying on their own. It also conveys the idea that the one person who knows the most about their aviation selves—their instructor—trusts them enough to leave them alone with the airplane. Flying solo is how students gain the confidence that prepares them for the responsibility of becoming a private pilot.

This same instructor told me that at the 25 hour mark, his students feel they are learning so much that many of them lose interest in flying solo. What he didn't recognize is that his students' confidence levels had become dependent on his presence in the cockpit. They don't want to fly alone because they've never learned to trust themselves. What a sad thing to do to a student pilot.

Keep in mind that you don't need to teach students everything about flying before their first solo flight. You only need to provide them with the required *base* of knowledge and skill, as well as ensure that they are capable of handling the specific conditions of the first solo flight. If they're ready to solo, they solo.

What's the payoff? Student pilots learn to trust themselves as well as learn how much you trust them. Delay their solo and you delay developing the essential qualities responsible for making them confident and capable private pilots.

Lesson-9

When Is A Student Ready for Solo? Q&A

By Rod Machado

Greetings Mr. Machado:

How do you know when a student is ready for a checkride or ready to solo? I've squeaked by until now doing flight reviews and instrument proficiency checks, but I have four students (two IFR and two Primary) and the time is getting close for them to take their checkrides. I'm hesitant to recommend them without knowing if they're ready. I'm being really conservative. Any help would be appreciated.

Thanks
Tom

Greetings Tom:

Knowing when a student is ready to solo or ready for a checkride implies that you understand the difference between acceptable and unacceptable flying behaviors. That's why, when teaching CFI applicants, I show them several variations of passable vs. failing flight performances. For instance, I'll demonstrate an acceptable ground reference maneuver, then turn around and show the applicant an unacceptable version of that same maneuver. Then I explain the difference. I do this with most of the maneuvers on the *Practical Test Standards*. It should even be done with oral questions. After all, a CFI student needs to know how to evaluate his student's verbal performance, too. Therefore, I recommend that you find an experienced CFI and have him or her show you the difference between passable and failing flight performances. You might also hire a designated examiner for an hour or two and have him or her show you these differences.

In regard to solo, I find that *consistency* is the most important factor in determining whether or not a student is ready. If students are consistent in their performance, then I can rule out *luck* as a factor in their flying ability. Even if students make *safe* but firm landings, all that matters is that these landings are consistent. Of course, these landings shouldn't be so firm that we end up looking like graduates of the Quasimodo posture school. Nevertheless, I'll solo a student who makes 10 firm—but safe—landings in a row, while refusing to solo someone who makes nine greasers followed by a landing where I have to grab the controls to prevent damaging the airplane.

Finally, one of the most helpful things you can do to identify when students are ready are ready to solo is to ask them. Yep, this works—most of the time. Based on my experience, you'll find that 15% of your students will say they're not ready when they are, 10% will say they're ready when they're not and 75% will tell you when they're actually ready. I remember hearing an instructor call the tower and say, "Tower, I've got a student who's ready to solo here." While the mic was still keyed, I could hear the student in the background saying, "Noooooooo! I'm not ready yet." How do you weed out the 10% that are not ready but think they are? I'll bet money that the majority of these students aren't consistent in their flying performance.

Supervising Our Students

By Rod Machado

What does it mean to properly supervise a student during and after solo flight? When I ask that question of flight instructors, it becomes clear we don't all agree and that we've lost an understanding of the responsibility we have to guide and monitor our students.

For example, one instructor told me that once he's satisfied his students can fly solo safely, he lets them come and go to fly solo as they please, without having to notify him of the act. Really?

As I see it, there's nothing a primary student does or will do that shouldn't be done under the careful supervision of his or her instructor. *Nothing*! That means either direct supervision (as in supervising a first solo flight) or indirect supervision (as in listing requirements for solo).

I list a minimum of 10 separate requirements for solo flight in a student's logbook. The most important requirement reads, "Student must obtain CFI's (my) permission at least 24 hours before any solo flight." No permission, no solo. Period. I want to know the exact "when and where" of each solo, and so should you.

Unfortunately, some of us mistake supervision with being strict, mean and demanding. Younger instructors in particular seem to worry about being considered a chump by insisting that their students be carefully supervised. There is, however, nothing strict, mean and demanding about supervising your students when you are the one responsible for their well being. After all, it's your name on their student pilot certificate and in their logbook. You have an obligation to carefully supervise them.

The benefit to you is that your legal liability is reduced while you gain an enviable safety and training record. The benefit to your student is that he or she learns that flying safely is based on a set of standards. While those standards will change over time, the idea that there are personal limits to be honored is a worthy behavior to transmit to your charges.

Lesson-10

Developing Standards

By Rod Machado

Give a pig and a boy anything they want, and you'll get a fat pig and a bad boy.

Recently, a newly rated instructor, whom we'll call Bob, told me about his primary student who desired to fly solo at night. While reluctant, Bob acquiesced to his student's request. The next week, that same student managed to get lost in the traffic pattern one night after following the controller's instructions to extend his downwind leg. Upon hearing of his student's night debacle, Bob confessed, "I knew it wasn't a good idea to let this guy solo at night."

Being a good instructor occasionally means saying no to a student's request. The question is, How do you know if a student's request is reasonable or unreasonable? Bob clearly had second thoughts about permitting his student to fly at night, but he didn't have a strategy for evaluating the merits of that request.

Here's one of the great flight training lessons I learned a long time ago: Because I behaved a certain way in the past doesn't mean that my students are now permitted to behave this way, too. If teachers, parents or guardians didn't learn the same lesson, they'd have no basis on which to demand good behavior from those they supervise. After all, everyone can recollect an example of less-than-stellar behavior from their past. A grade school teacher once asked my school chum if his dog really ate his homework. He replied, "Yes, but I had to force him to eat." That's bad behavior and we've all been there. The lesson to be learned here is that we shouldn't let our personal history override our better judgment when supervising our students.

It turns out that Bob's instructor let him fly solo at night. Therefore, it only seemed fair to Bob to let his student do the same. There are several things wrong with this rationale.

First, we can't assume that Bob's instructor did the right thing with Bob. Sure, Bob may not have experienced problems soloing at night, but that doesn't make a night solo any less risky for a student pilot.

Second, newer airplanes and modern airports demand more from student pilots today than they did in the past. Soloing students at night at Everybodygone airport in a Cessna 150 is less risky than soloing them at Itbecrowded airport in a Cirrus SR22. There was a time when the tower would simply yell at you if your nosecone was a foot over a runway hold line. Now, it seems as if everyone wants to get in on that action. It's as if people from different airports line up to yell at you, to say nothing of the spanking you're likely to receive from the FAA.

So, how should you evaluate a student's request? Begin by listening to your gut. If you initially wonder whether or not your student's request is reasonable, then there's a good chance that it's not. Let your gut reaction be the inspiration to ask the following questions:

What are the challenges your student is likely to encounter by doing the activity in question?

How is your student likely to handle these challenges based on his or her present level of training?

Finally, given your understanding of human nature, how likely is your student to behave properly when you're not there to supervise? It's your understanding of human nature that allows you to make grand generalizations about how students might behave when left unsupervised.

Years ago, my primary student Tommy (a junior in high school at the time) requested to fly a cross-country trip to a high altitude airport to have lunch with his girlfriend. I let my understanding of human nature do the math for me here: young male full of testosterone + girlfriend + glamour of flying an airplane = meeting a long line of people who want to scold you and ensure that you receive an FAA spanking. So sorry. No lunch for Tommy and Betty.

Sometimes you must make decisions with little or no precedent for guidance. Begin by refusing to let your past behavior *automatically* justify your student's present or anticipated behavior. Ask yourself if your student's request is a reasonable one. Then listen to your gut and your brain. Let your understanding of human nature guide you. This is how you make better choices and avoid a long line of people who want to yell at you and arrange for you to receive an FAA spanking.

Lesson-12

A Scan Plan

By Rod Machado

There are probably as many ways to scan instruments as there are candles at a Madonna concert. Here's a version that may not be so overwhelming to your primary students during their first introduction to the subject.

Starting from straight and level flight, cover up five of the six main instruments. Leave the attitude indicator (AI) uncovered. Have your student imagine that the AI is a miniature window to outside world. Flying straight and level is simply a matter of keeping the miniature airplane's wings aligned with the horizon line.

Introduce the turn by having your student bank the AI's miniature airplane until it aligns with the first white diagonal line shown below the horizon line. This is the 15-degree bank line. This line makes it easy for a student to roll into right or left turns without having to look at the sky pointer. Now introduce additional instruments, one at a time.

Start by uncovering the altimeter. Have your student scan back and forth between the AI and the altimeter. Have him make *small* pitch adjustments (perhaps one-half to one bar width) to keep the altitude constant. Try the same thing while making right and left turns. He'll be amazed how easy it is to maintain altitude with these two instruments.

Next, cover the altimeter and uncover the heading indicator (HI). Show the student how to make slight changes in heading by lowering a wing just below the horizon line on the AI. For larger turns, have your student bank the airplane to the first diagonal bank line (15 degrees of bank). Instruct him to lead all heading rollouts by 10 degrees.

Cover the HI and uncover the airspeed indicator (ASI). Demonstrate the proper attitude for a climb and descent, as well as the appropriate power settings for each. Your student only needs to remember three pitch attitudes (climb, level and descent) and three power settings to remember (climb power, cruise power and descent power). Have her scan back and forth between the AI and ASI. Practice making small pitch adjustments on the AI to maintain the desired airspeed while climbing, cruising and descending. Don't forget to mention trimming for each attitude, either.

Finally, uncover all the instruments except the turn coordinator and VSI. For an initial introduction, I find it best if they don't even think about these two instruments. Leave them for a future lesson.

I've had great success with this method. The secret is not to overwhelm a student with too many instruments at one time. I hope you find it useful.

Lesson-13

Vertigo

By Rod Machado

Unusual attitudes are part of every pilot's instrument training. The exercise simulates recovering from a loss of control which is often due to spatial disorientation. Unfortunately, our method for introducing unusual attitudes isn't always realistic.

Unusual attitude training begins with a student (wearing a view limiting device) looking down into his or her lap. Then we attempt to induce vertigo before giving the student a signal to recover. In real life, however, pilots get themselves into the unusual attitude on their own, without any help from us. Before they know it, vertigo forces them to grapple with a runaway airplane. So why not let your students create their own unusual attitude before applying their recovery skills? Here's how you might do this.

The next time you simulate an unusual attitude have your student look *down* into his lap with his eyes *closed*. But instead of maneuvering the airplane into an unusual attitude yourself, let him do it. Yes, I know he can't see, and that's the point. Tell your student that he should fly the airplane head down and blind for as long as possible. Inform him that you expect he'll eventually lose control, at which point you'll instruct him to look up, open his eyes and apply the recommended recovery technique.

To enhance the process, ask for a few shallow turns, then a few steep ones. You can even have him move his head up and down, right and left while his eyes remain closed. Adding a little nose-up or nose-down trim to nudge the airplane from level flight is also a good idea. It won't be long before he coaxes the airplane into an unusual attitude all by himself. Believe me when I say that he'll have a hard time guessing his attitude beforehand.

Most students assess cockpit clues with sufficient precision to anticipate unusual attitudes induced by their instructor. They know what's coming. Where's the realism here? Let them get into an unusual attitude on their own with their eyes closed, hood on and head down and you've added an enormous amount of realism to the demonstration. As they begin their recovery, they must deal with a contradiction between the airplane's actual attitude and the one they've imagined. In some cases, despite looking at their instruments, students will still attempt to follow their bodily clues. It's a learning experience that they're not likely to forget.

Lesson-15

The FAA's New "Not-So-Slow" Slow Flight Procedure

By Rod Machado

As most flight instructors know the FAA recently changed the requirements for slow flight in the private pilot ACS. Slow flight must now be accomplished at a speed higher than MCA or *Minimum Controllable Airspeed* (a speed at which the stall horn is continuously activated). Why? The FAA feels that when pilots hear a stall horn, they should take immediate stall-recovery action. If slow flight is practiced at MCA, then the stall horn will be heard continuously without the pilot going through the motions of recovering from a stall. The FAA feels that this will desensitize pilots to the stall warning, thus making them less likely to recover from an actual stall should one occur in flight. The FAA, however (and with all due respect), is a little confused about the purpose of a stall warning horn.

The activation of a stall warning horn or light is not an indication of a stall. It's an indication that the airplane's wings are *approaching* their critical angle of attack—the angle of attack that, when reached, results in a stall. In fact, the airplane's speed at the moment the stall warning activates is at least 5 knots above stall speed, if not more.

FAR Part 23 requires a stall horn/light to activate at a *minimum* of 5 knots above the airplane's actual stall speed. In many instances, the warning can activate at a slightly higher speed above the airplane's actual stall speed (it all depends on the manufacturer of the stall warning unit to say nothing about how normal wear affects the device). When the stall warning activates, the airplane is still flying. Yes, it's flying on the back side of the power curve, but it's still flying. You can still turn right, left, descend and even climb in most small airplanes. The controls are mushy, but they still work. Stall warning activation doesn't imply that your airplane has stalled. Nevertheless, the FAA conflates and confuses the stall warning with an actual stall.

Now, don't get me wrong here. If a pilot heard the stall horn and wasn't expecting to hear it, then he's clearly closer to the critical angle of attack than he thinks he is. In this instance, he should apply standard stall recovery procedures: reduce angle of attack and add power. This is why the stall horn/light is called a *stall warning device* and not a *stall detection device*. It warns a pilot of an impending stall should he or she continue to increase the angle of attack (a stall detection device would activate only when the critical angle of attack is reached, and what good would that be to a pilot?).

What if the pilot intends to fly at the airplane's minimum controllable airspeed? In this instance, the pilot would *expect* to hear the stall warning. After all, he knows he will be operating very close to the critical angle of attack. Hearing the stall horn when he expects to hear it doesn't in any way diminish the value of hearing a stall horn when he doesn't expect to hear it. *Expecting* something and *not expecting* it are two distinct psychological states in which a stall warning device serves the pilot. After all, when my kitchen's smoke alarm goes off when I'm cooking (as I often expect it to) that doesn't mean I'm less likely to respond appropriately to a smoke alarm when I'm not cooking. Context is very important here. Hearing a stall warning when flying at MCA doesn't diminish its value in alerting a pilot to an unexpected stall, should one be imminent. (If you want to know the primary reason a pilot might disregard the stall horn/light, then read my *License to Learn* column in the November 2016 issue of AOPA *Pilot* titled, *When Pilots Stall and Don't Recover.)*

The meaning offered by the stall warning device depends on how a pilot is flying his or her airplane at any given time. To say that a pilot should always apply stall recovery procedures when the stall horn activates is to limit his ability to properly fly his machine. After all, it's possible that you might hear a stall horn activate in a Cessna 172 (stalls at 50 knots IAS) when descending at minimum sink speed (57 knots

IAS). You'll also hear a stall horn if you want to make a turn (at MCA) in the shortest radius to extricate yourself from a boxed environment. The stall horn will also wail continuously when practicing falling leaf stalls—an essential maneuver for teaching the proper use of rudder in stall recovery. And if you want to learn how an airplane handles during the landing flare—and what student doesn't?—you'll need to practice flying slow at MCA.

So how will the FAA's new slow flight policy affect the development of private pilots? Unfortunately, newly certified private pilots will have little or no experience operating the airplane on the back side of its power curve. Oh wait, you say. Flight instructors can still teach flight at MCA. Maybe so, but wouldn't that directly contradict the FAA's original rationale for increasing the speed at which slow flight is performed? Do you actually think that FAA inspectors giving CFI candidates their checkrides are going to look favorably on CFI applicants who slow-fly with the stall horn activated? I don't think so. The fact is that slow flight at MCA will disappear from aviation's cultural knowledge base in the same way that the knowledge to perform steep spirals disappeared from the aviation community many years ago when the FAA removed steep spirals from the PTS. The FAA put steep spirals back in the PTS 10 years (+/-) later. When they did, very few instructors knew how to perform, much less teach this maneuver.

This, however, isn't the really big concern I have with the new slow flight change. The first of two serious issues with this new policy involves the speed at which the FAA recommends that students fly slow. In its recent Slow Flight SAFO, the FAA's method of determining the allowable speed at which to slow fly will permit the maneuver to be performed at speeds up to 1.34 Vs. Yes, you read that correctly: 34% above stall speed. That's higher than the approach speed recommended for today's modern trainer (which is 1.3 Vs). The second serious issue with the new slow flight requirement is how it detracts from learning basic attitude flying skills. The new slow flight requirement forces students to focus on their airspeed indicator to prevent activating the stall horn. When slow flight was practiced at MCA, students primarily focused on managing their angle of attack and flying coordinated by looking outside the airplane. There was no reason to look at the airspeed indicator because the student's ears were free to assess the proximity to the critical angle of attack. With the FAA's new slow flight requirement, students are now compelled to spend more time with their eyes directed inside the cockpit focused on their airspeed indicator. Basic attitude flying skills will diminish as a result.

Keep in mind that the FAA and NTSB have pushed hard for the past several years to reduce loss of control accidents (LOC). These types of accidents imply that there was a deficiency in a pilot's ability to *control* the airplane. These pilots didn't suffer from a loss of "decision making ability" or loss of "risk managing ability." They suffered from a loss of "control," which involves the flight controls of an airplane. Every bit of evidence available today suggests that pilots primarily lose control of their airplanes because they fail to fly them properly, not because they fail to make a decision properly or manage a risk properly (yes, judgment and risk management play a part, no doubt. But the evidence suggests that these are not majority players in aviation accidents (read the HFACS 2005 studies for evidence of this assertion). So, how does a dumbing-down of basic airmanship skills as a result of the new slow flight requirement help reduce LOC accidents? It doesn't. And that's the sad part about the direction the FAA has taken with its new flight training philosophy.

Over the past 15 years, beginning with FITS (FAA Industry Training Standards), the FAA has moved toward an airline-type training philosophy for general aviation pilots. The process continues with the ACS's new slow flight requirement. As the FAA sees it, if airline pilots are trained to apply stall recovery procedures upon activation of an airliner's stick shaker, why shouldn't general aviation pilots do the same the moment the stall horn is heard in the cockpit. What the FAA fails to consider is that general aviation pilots are not airline pilots. Ultimately, the FAA is either unwilling or unable to understand this concept. Once again, I am not anti FAA; I'm anti bad ideas.

Lesson-16

An Alternative VOR Explanation

By Rod Machado

Why are different VOR explanations like cheap wine? Is it because the instructors who teach these have names like Mad Dog or Thunderbird? Nope. It's because each appears to convey the same information. But the moment you sample the goods, the difference is striking.

Recently, I overheard a flight instructor present an introductory lesson on VOR navigation. He began with a discussion of VOR radials. "You track to or from a station on these radials," he said. "Going to a VOR station requires that you set the reciprocal bearing of the radial into the OBS. If you don't, you'll experience something known as reverse sensing."

This instructor wasn't teaching. He was simply disgorging facts to a confused student, a student who stared at him like a dog looking at a fan. What a shame.

One purpose of instruction is to assemble facts into a meaningful and memorable package. A meaningful package is one that helps students understand the concept. It helps them see how the facts relate to the basic idea. Memorable packages stick in a student's mind, either because these are easy to understand or because they're unusual in a quirky way.

For example, many years ago I discovered that it wasn't practical to use the term *radial* during an initial presentation on VOR navigation. Students often became confused at the thought of traveling inbound to a station on the 090 degree radial and outbound on the 270 degree radial. It was simpler to talk about traveling to and from a VOR station on a *course*. I'd speak of traveling *to* then *from* the VOR on the 270 degree course. This method is a little more intuitive since a *course* is the value selected with the VOR's *course selector*.

I mentioned that there were 360 courses, each spaced one degree apart, running through the center of each VOR. The student could select any of the 360 courses desired with the course selector. Once selected, the needle and the TO/FROM flag provided information specific to that course.

I never mentioned the word *radial* until the student understood the basic concept of VOR navigation. Yes, it's true that students may be asked to track to a VOR on a specific radial. No doubt, they need to know what this means and how to do it. But this is easier to teach once VOR basics are understood.

Here's how I presented the concept of tracking to a station on a radial.

Imagine a major highway running upward from the bottom on this page through the center of a small town. The road going into town is Route 180 and the road leading out of town is Route 360. It also happens that this major highway is aligned in a direction of north. Therefore, you'd drive into town on Route 180 and out of town on Route 360. All the while, the car heads in a northerly direction—a direction of 360 degrees.

Then I'd draw a VOR (named *Town VOR*) with its 180 and 360 degree radials aligned next to the highway example. Now you can see that the 180 degree radial is simply the *name* of the route (Route 180) that takes you upward (northward) into town. Therefore, when 360 degrees is set in the course selector, you'll travel to Town VOR on the 180 degree radial and from Town VOR on the 360 degree radial (while heading 360 degrees, of course).

Finally, I'd tell my students that the airplane's VOR receiver is like a handheld FM radio. It receives irrespective of the angle or the direction the radio points in relation to the transmitting antenna. VOR receivers are similar in that they don't know which direction they face from the transmitting antenna. Therefore, to make sense of the needle (CDI) and flag (ambiguity indicator), you must point (or imagine pointing) the airplane in the direction of the selected course. Now the needle and flag tell you two things: whether the selected course is to the right or left of the airplane and whether you'd travel to or from the VOR if you were on that course.

The secret to an effective presentation is feedback. Present your lesson then ask your student for their input. As a new instructor, I discovered that discussing *reverse sensing* in the initial VOR session made most students lose their desire to exist in corporeal form. Why discuss the way *not* to do something before a they

first learn how to do it properly? This is a bit like practicing bounce recoveries before a student begins landing practice. Save *reverse sensing* for later.

Anyone can present the facts. It's more fun to present them in a meaningful and memorable way. So use analogies (the highway), metaphors and examples (the FM radio) in your VOR presentation. The more relevant these are to your student's experience, the better it is for him. And it doesn't hurt if the examples are a little offbeat too.

VOR Navigation the Visual Way

By Rod Machado

"En garde! En garde!" Isn't that what flight instructors hear when teaching VOR navigation? After all, in the hands of a student, those VOR needles often move like swords at a Zorro convention.

Yes, VOR navigation is sometimes a source of frustration for student pilots. While the fundamentals are often understood, skill at keeping the needle centered is elusive. Here is a technique that I find useful in helping students master this skill.

First, students don't often get the opportunity to observe their actual ground track toward a VOR station. Consider that most tracking is done at a great distance from a station and a high altitude above it. Therefore, students seldom see the object of their aim.

During your VOR navigation lessons, let your students track visually to a nearby VOR at 1,000 feet AGL (or as low as safety permits). This allows them to view the station over the cowling as it is approached. With the station in sight, most students have little or no difficulty centering a VOR needle. In fact, they often comment on how easy it is to keep the needle centered this way. Have you ever thought about why this is? The answer is: picture and patience.

One or two sessions of visual VOR tracking helps students *visualize* the airplane's relationship to the aiming point (the station). This makes the geometry of tracking less abstract for them. With the station in sight, they'll immediately notice that it doesn't take much of a correction to stop and recenter a wandering VOR needle. In other words, a 10 degree correction appears quite substantial when viewed over the cowling compared to how it appears on the heading indicator. This technique tends to keep students from overcorrecting when using the DG as a heading reference.

The over-the-cowling picture also helps students develop *patience* while tracking. They become more willing to tolerate a slow needle response when they can actually see their angle of intercept or their wind correction angle. The over-the-cowling picture lends confidence that these angles, although small, will eventually work.

Additionally, a visual introduction to VOR navigation helps identify the point where it's unwise to chase a deflecting VOR needle because of close proximity to a station.

Try introducing your students to VOR navigation *visually*. Give them the opportunity to *see* the station while tracking. This provides the basic building blocks upon which more complex navigation skill is based. Try it, you'll like it.

Lesson-21

Technology and Pilot Skill Level

By Rod Machado

Last year I spied a woman pointing and jabbing a car key at an automobile while exclaiming, "Come on, open up!"

I asked what was wrong and she replied, "My remote won't unlock the door."

I responded with, "Have you tried putting the key in the door and unlocking it that way?"

Apparently, she had never unlocked a car door by putting the key in the lock.

Generally speaking, technology either liberates us, or enslaves us by increasing our dependence on its use. It liberates us if it helps us to think and behave better. It makes us dependent if we allow the behavioral skillset replaced by that technology to atrophy or disappear. Key Lady's dependence on her key's remote function prevented her from entering her automobile once she lost access to that technology. She became a ward of the state—the state of technology, that is. Does the same apply to those of us who fly airplanes with modern technology? You bet it does.

Consider the relatively recent stall/spin crash of Colgon Flight 3407. Would anyone suggest that cockpit technology made the captain of this airplane less dependent on its use? The airplane was on autopilot during an approach when the captain mishandled the throttles and stalled his Dash-8. He took over manually and attempted stall recovery by moving the throttles forward and raising the nose. That was his ticket to spin city. It's most likely that this captain had little experience hand-flying his airplane, much less with practicing proper stall recovery techniques. Reliance on autopilot technology appears to have diminished his basic stick and rudder skills. The same can be said for those of us who depend on autopilot equipment to help us fly our smaller, general aviation airplanes.

Technology can have a negative effect on our cognitive flying skills, too. An early NASA study on autopilot technology revealed that a sophisticated two- or three-axis autopilot is best used by multi-pilot crews, while single-pilot operators are best served by heading-hold or wing-leveler units. According to NASA, use of a multi-axis autopilot by single-pilot IFR operators tends to remove them from the control loop. In other words, it takes their head out of the game. Isn't that just another way of saying that these pilots have become more dependent on the technology they're using?

Autopilots aren't the only types of technology that can increase our cockpit dependence while decreasing our cognitive, physical and perceptual flying skills. Today's pilots seem to rely more on their traffic alerting equipment (TIS, TAS and ADS-B) to identify traffic conflicts. Their "see and avoid" perceptual skills have certainly atrophied, if not completely disappeared. And what about pilots who have lost their skill at "tracking" a course? Instead, they "home in" on the destination by tilting their wings until the moving map's symbolic airplane moves toward the GPS' "magenta" course line. In these and other instances, technology increases a pilot's dependence on its use at the expense of maintaining basic flying skills.

Ultimately, each of us is responsible for maintaining the flying skills that are in danger of being usurped by technology. If we do, then technology liberates us. It helps us think better, fly better and fly with greater confidence. However, failure to do so often leads to anxiety (if you have to hand-fly an airplane using atrophied flight skills) or calamity (if you no longer have access to those skills when they're needed). On the bright side, airplanes don't have door keys with remote controls. So pilots will at least have *access* to their airplanes.

Lesson-23

The Dark Night Rises

By Rod Machado

I remember the time I spent an entire day at a nearby airport filming video segments for an online aviation magazine. It was the perfect confluence of airplanes, sunlight and even more sunlight. That's right. For eight hours, the cameraman kept a large light reflector pointed at my face. You know you've been out in the sun too long when you hear the sound of bacon frying and there isn't any bacon. Yeah, that was my face. At the end of the day I was camera crispy, but that wasn't the worst of it.

Toward the end of the session, we filmed a few landings from inside my A36 Bonanza. Everything went well, except for the landings. For a reason that I'll reveal soon, my depth perception was off, rendering me unable to properly estimate the height for the landing flare. Thump! OK, we all have bad days but few of us have them on video. With daylight waning, we packed up and I flew off into the sunset. Literally. The sun was setting as I approached my home airport. That's when I went blind—or nearly so.

While on a left base to 19L, I glanced toward the runway. It was gone. So was the airport and coastline. Bermuda Triangle? Not this time. Unbeknownst to me, I was staring in my own reality show titled, *When*

Night Blindness Strikes. Believe me when I say that a two-lane airport with a high-volume mix of airliner and GA traffic is the last place you want to lose sight of your sight. My instinct had me climbing away from the airport, returning 20 minutes later once my eyes had begun acclimating to the dark.

I was the victim of extreme photobleaching. It turns out that the cells in your retina that are responsible for night vision, known as *rods*, contain a light sensitive chemical called *rhodopsin*. I'm very fond of chemicals, especially this one, because it's responsible for our sight. When sunlight strikes the rods, the chemical rhodopsin splits apart (a process known as *photobleaching*) and initially forms two other chemicals, *opsin* and *trans-retinal*. As this split occurs, a small amount of electrical energy is released and sent to the brain via the optic nerve. This is what forms an image inside your noggin. Eventually these chemicals recombine to form rhodopsin (they become *unbleached*), which once again becomes useful for converting light into sight.

The problem occurred because I spent way too much time in direct (and directed) sunlight. Since rhodopsin can only be replenished at a certain rate, I managed to photobleach a substantial amount of my eyes' available supply. My subsequent exposure to darkening conditions rendered me night blind.

As a general rule, it takes about 30 minutes for the eyes to replenish their supply of rhodopsin and adapt to the dark. You can, however, achieve a moderate degree of adaption to the dark after 20 minutes if you're using dim red cockpit lighting.

Since then, I've learned to wear sunglasses when shooting videos in direct and intense sunlight. I'm even prepared to slip on an arc welding helmet if the cameraman treats me like an ant under a magnifying glass (the Darth Vader look should eliminate any chance of being ramp checked, too).

Over the years my fondness for unsplit rhodopsin has grown even stronger, especially since it regenerates at a slower rate as we get older. Age also tends to diminish the amount of light entering the eye. The retina of a 60-year-old person receives only one-third of the light it did at 20 (even during the daytime). You don't have to be a rhodopsin scholar to realize what this means in terms of your eyes' ability (or lack of it) to adapt to night time conditions with age.

If that weren't enough, your color sensitivity declines with age, making it more difficult to discern what lies beyond your airplane's windscreen at night. Blues (taxiway lights) and greens (threshold lights and right-wing position light) are more affected than other colors and become less detectable. Of course, FAA inspectors wearing blue or green jumpsuits are harder to see at night, too. One might easily nab you for a ramp check, unless you were wearing your arc welding helmet, of course.

Considering the eye's limitations, a part of me wishes I were a bat, or at least carried one in my pocket during sunset flights. Echolocation has never looked so good; at least, that's what I hear. So give your eyes time to adapt before the dark night rises, especially if you've spent a bright day in the sunlight.

Night Magic

By Rod Machado

Do you know what magic is? It's really pretty simple. It's the exact opposite of what a (good) teacher does. The teacher provides perceptual information that leads to insights and ultimately ends with you understanding something.

The magician, however, prevents you from understanding anything, lest his slight go over like a pregnant pole vaulter. The magician does this by using misdirection to keep you from seeing what he's actually doing. If you can't *see* what's happening, it's hard to *understand* what's happened. This is why I still check behind my ear when I need a quarter. Let's call this the *magic effect*, because it can lead us to believe what we see, when seeing shouldn't lead to belief.

I'll bet the last rabbit in my hat that anyone who's ever driven a car at night has experienced the magic effect to some degree. At night, we can see lighted objects at great distances in much the same way we see normally illuminated objects during the day. We can't, however, easily see non-lighted objects such as the road, curves, or foreign objects along the periphery of the road. When it's dark, we're deprived of vital visual information that keeps us from understanding our speed in relation to the road.

It's magic, right? Without this information to stimulate our brake gland, we tend to drive faster than is safe. This is one very big reason that 40% of the fatal car accidents occur at night despite there being 60% less traffic during that time. Said another way, we're bringing daytime driving strategies to the road at night, and we're paying a hefty price for it. It's as if we're at a magic show being fooled, and we don't even know it.

For those of us who fly at night, the magic effect is also in full force, especially when the approach environment offers a dark or featureless foreground next to a lighted background. Approaching an isolated desert airport at night or an airport from over the water at night is a good example. The dark environment below prevents us from having sufficient visual clues with which to assess our height above the ground. Our natural response is to use what lights we do have to make this assessment. This means using the distant runway edge lighting as well as the far off environmental lighting around the airport to make this assessment. This is where the magic begins.

More than one study has confirmed that using only background lighting clues when approaching from over a dark foreground tricks the mind into thinking the airplane is higher than it actually is. Sometimes, twice as high. If we act on that effect, our response is to descend prematurely or increase our descent rate. The end result is often a landing when there's no airport beneath the airplane, otherwise known as CFIT, or *controlled flight into terrain*. The lack of perceptual information from beneath our airplane lures us downward, as if our machine is being drawn into a black hole. Not surprisingly, this magic effect is known as the *black hole illusion*, and it's one of aviation's most deadly perceptual illusions.

Avoiding falling prey to the black hole illusion means avoiding the use of daytime flying strategies when operating an airplane at night. So let's begin with a very common daytime landing strategy that we surely want to avoid at night—the *straight-in approach*.

Long straight-in approaches at night to runways having no visual or electronic glidepath information provide the perfect setup for the magic effect. A good nighttime strategy for landing is to overfly the airport and enter a normal traffic pattern for landing. You might even gain a tactical advantage by keeping the pattern a bit tighter and using short-field (over an obstacle) landing procedures even when no obstacle actually exists in the landing environment. Why? Because remaining closer to the runway environment means having more perceptual lighting clues with which to assess your height above ground. This is why the research shows that the black hole illusion tends to become less effective (less illusory) as you move closer to the runway.

What happens if you're making an approach to a runway having a VASI or a WAAS-based advisory glidepath? The answer is simple—use it. But use it based on its stated limitations. For example, most VASIs offer obstacle clearance only when the airplane is within 10 degrees of either side of the runway centerline. Keep in mind that some VASIs are offset from that centerline, to provide a descent path away from local obstacles (read about those things in the *Digital Chart Supplement d-CS*).

Let the buyer beware. Even with VASI (or electronic glidepath) information, the black hole illusion still temps some pilots to leave the glidepath prematurely, resulting in red and white lights turning green as the light filters through the grass. This is one instance where you don't want to feel either the magic or the grass beneath your feet. Resist the urge to merge with featureless terrain below you.

In his book *Illusions*, Richard Bach wrote that when you know what the magician knows, it's not magic anymore. The magic works only as long as the magician can limit what we see. Unfortunately, a dark environment often accomplishes the same thing for pilots, leading us to a big misunderstanding of our airplane's proximity to the ground.

That's why it's important to understand how the black hole illusion works. It's one instance where seeing the lights does not mean that we've "seen the light."

Lesson-27

A Checkride Persona

By Rod Machado

A Checkride Persona By Rod Machado A common question students ask is about how to pass a checkride. In response, most instructors administer the correct advice regarding knowledge, preparation and so on. Yet, I seldom hear instructors talk about the proper persona to display during the practical oral and flight exam.

The checkride persona a student presents during this exam has a lot to do with how favorably or unfavorably he's looked upon by the designated examiner. What's the persona of which I am speaking? I'm referring to the type that conveys a sincere interest in learning, humility, optimism, a disposition toward safety, confidence without hubris, and an inclination toward the cautious behavior that all examiners want to see before they etch their name on a student's pilot certificate.

You might argue that your student, while safe in the air, doesn't overtly demonstrate these qualities during normal conversation, since it's not a part of his personality. My advice for that student is to do what he or she often does on a first date—act like the person you think the other individual wants you to be. Of course, I'm assuming that a student won't be ingenuous when acting out these qualities. Instead, he or she will simply exaggerate them for easier detection. The examiner isn't just asking, "Does this person have a collection of mechanical skills?" He's really asking, "Is this person ready to be a safe pilot in command?"

So the next time you're preparing a student for his or her practical exam, give the person some feedback on their demeanor. Let them know how they're coming across to you and how their behavior might be interpreted by the examiner. Help them convey the persona of safety, confidence and humility that all examiners want to see on a checkride.

Final Thoughts on Flight Instructing

Making a Living as a CFI

By Rod Machado

I can't tell you the number of times I've heard someone say, "You can't make a living as a CFI." For some people this may be true, but it doesn't have to be. Given enough experience and the right conditions, you can easily make a decent living as a flight instructor.

There probably has never been a better time to be a flight instructor. The airlines are hiring, which makes it difficult for many flight schools to hold onto their high-time instructors. Look in any major aviation publication and you're sure to see want-ads for CFIs. In my travels around the country I've even heard of FBOs closing their doors or eliminating their flight training departments because they can't find qualified CFIs. If you're interested in working as a full time flight instructor, here are a few things to consider.

Before a flight instructor can expect to make a reasonable wage, he or she needs a little seasoning. Expecting a top-dollar hourly fee during the first year of teaching is unreasonable. Those with a few years experience in the business, though, can expect to charge fees ranging from $35 to $60 an hour (and higher).

I know several CFIs who charge $500 a day for training in specific airplane types. These folks have acquired enough additional training to qualify themselves as experts in specific makes and models of airplanes:

Malibus, Bonanzas, cabin class twins, etc. One CFI that I know has developed such a well established reputation that operators fly their airplanes from all over the United States to his home airport just for a full day of specialized training. He's fully booked months in advance.

Treating flight instruction as a business is the key to making a good living. For instance, many years ago I ran into a CFI in the California area (let's call him Hank) who makes well over $50,000 a year as a full time flight instructor. Here's his strategy.

First, Hank has his students sign a *contract* for at least three two-hour lessons per week. This forces them to make a strong commitment to flight training. If the student has to cancel, the lesson can be rescheduled if notice is given at least 24 hours in advance. The results of a missed or hastily cancelled lesson are clear: payment is expected regardless of the excuse.

Given that each student consumes six hours of his time per week, Hank limits himself to working with only five clients at a time. This totals 30 hours of revenue producing time per workweek. An additional 10 hours of non-revenue time is invested in lesson planning and recording keeping, resulting in a 40-hour work week.

The beauty of this arrangement is that Hank makes money even when grounded by poor weather. After all, students need ground instruction in preparation for their license. He never fell into the trap of thinking that ground instruction deserves less recompense than airplane instruction. Why should it? After all, ground instruction has its own inherent risks. What about getting bitten by the airport dog, or poisoned by airport coffee? (The secret here is to get the dog to drink the coffee.)

Hank charges $35 an hour for flight or ground instruction. At 30 hours per week, this produces a guaranteed weekly income of $1050. Over a 50 work-week year, he earns a minimum annual income of $52,500 from flight instruction. This doesn't include income from other peripheral activities associated with flight training such as finder’s fees for airplanes sold, consulting fees, or other services rendered. In reality, Hank makes well over $52,500 per year.

Although Hank now relies strictly on word-of-mouth advertising, he originally advertised in medical and legal magazines. He'd place a small classified ad that offered a free consultation for anyone considering flight training. During the consultation, he'd explain his flight training program, the contract, and the pros and cons of owning an airplane. Of course, he always dressed professionally and had professional brochures to distribute, too.

Can you see why Hank was successful? He directed his marketing to the folks with sufficient disposable income. Sure, not everyone can afford to pay his prices, but Hank isn't marketing himself to these folks.

Can you earn a similar living as a CFI? With a few qualifications, I’d say, “Absolutely.” First, being in a large metropolitan area helps. Good weather helps, too, though with the sophistication of modern simulators the weather is becoming less and less of a hindrance to flight training, even for those taking primary instruction.

The next time someone says that it's not possible to make a good living as a CFI, please mention Hank's story. Remember, the average CFI in the business is becoming less and less experienced (they're all getting hired by the airlines). Therefore, it's not unreasonable to expect that the chances of making a good living as a full time CFI are becoming better and better.

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Rod Machado's
Private Pilot Audiobook
30+ Hours of Audio Ground School

ISBN 978-0-9712015-7-6

Price: $74.95 (Download)

Pilots Say...

If it wasn't for Rod Machado's Private Pilot Handbook on CDs, I wouldn't be a pilot. I'd finished the flying requirement. But hadn't taken the written or prepared for the oral portion of the checkride. It was difficult to find time to read. I'm a long-haul trucker. With these (MP3 files) I was able to study while driving. Only because of Rod's CDs was I able to get my pilot's license.
Long-haul trucker and new pilot

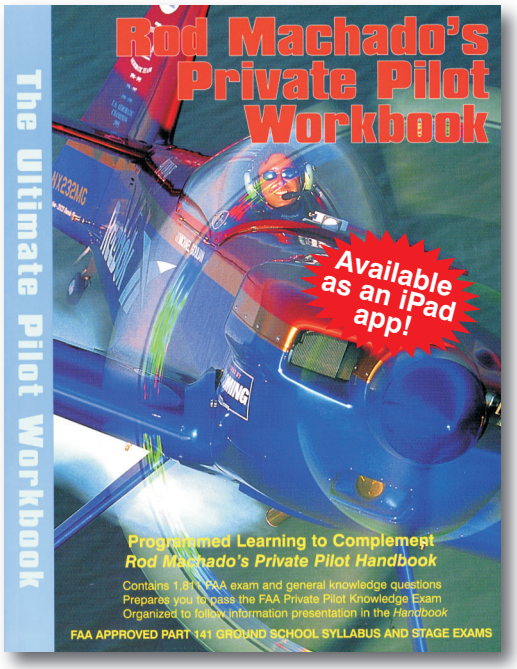
The longer I listened the more I realized how much I had forgotten or just haven't thought about for years.... These (MP3 files) are great fun to listen to.
David Lau, Watertown, WI

I have never met anyone who was a more informative speaker or better teacher than Rod Machado.
Kurt, C-177 pilot

Hey, I don't want to sound like a groupie, I just want to say thanks. I really enjoy Rod's books, etc., as well as his "technique" for getting his point across. I ENJOY learning from Rod! He is the best at what he does (come to think of it, no one else does what he does!) and I hope he keeps at it.
T.S.

Rod has wonderful and innovative ideas about learning to fly! I am an active flight instructor and find myself quoting him on almost a daily basis. When a student asks a question about a complicated subject, I usually answer with something like, "Well, Rod Machado explains it like this..." Rod is a true professional and has an innate ability to simplify and put into 'layman's' terms the difficult subjects encountered when learning to fly.
T.J. CFI

Rod Machado's Private Pilot eWorkbook



The new *Rod Machado's Private Pilot eWorkbook* is now available. As a programmed learning guide, this book will help prepare you for the FAA Private Pilot Knowledge Exam. The questions are organized to follow the presentation of material, section for section, as found in the *Handbook*. Not only will this book prepare you for the Private Pilot Knowledge Exam, it will help you understand and absorb the knowledge necessary for you to fly safely. You can test your knowledge and comprehension in each subject area with numerous weight and balance, performance, and flight planning problems.

This valuable one-stop workbook contains:

- An excellent, thorough and complete self-study system when used with *Rod Machado's Private Pilot Handbook*.
- 1,811 FAA Private Pilot Knowledge Exam and general aviation knowledge questions.
- Questions organized to follow the layout of *Rod Machado's Private Pilot Handbook* so you can test your knowledge and comprehension in each subject area.
- Color navigation charts & numerous weight-and-balance, performance, and flight planning problems.
- An FAA approved, Part 141 ground training syllabus for use in an FAA approved Part 141 ground school.

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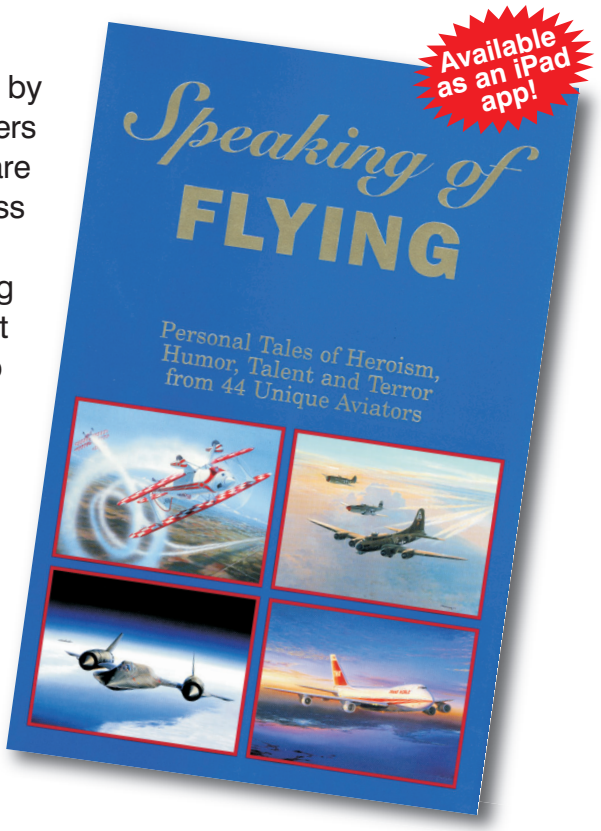
Speaking of Flying



This wonderful 438 page hardbound book was written by 44 pilots who are speakers with The Aviation Speakers Bureau. These funny, dramatic, and inspiring stories are some of aviation's finest tales. You would expect nothing less from aviation's celebrities, experts and specialists.

Our flight plan sees us barnstorming in the U.S., flying aerial combat missions in World War II and Vietnam, test piloting new aircraft, performing air rescue, winging to exotic places, and flying to historically important aviation places from Kitty Hawk to the moon. You will go along as history is being made and hear the pilot's perspective on some of these aviation firsts. You will find ACES and true heroes within these pages. *Speaking of Flying* is your ticket to adventure. Step aboard, and be prepared to laugh, cry, and feel the excitement.

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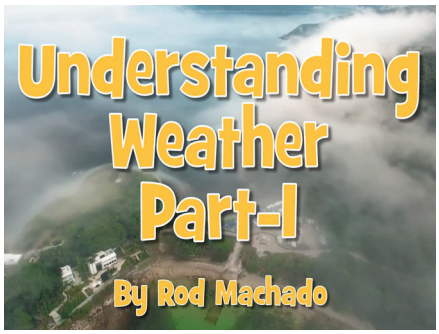
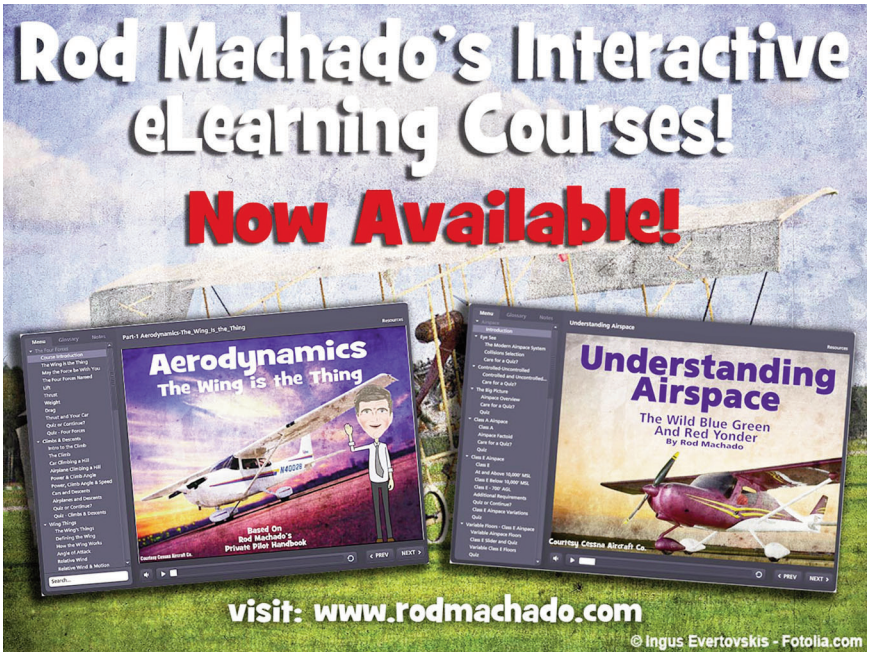
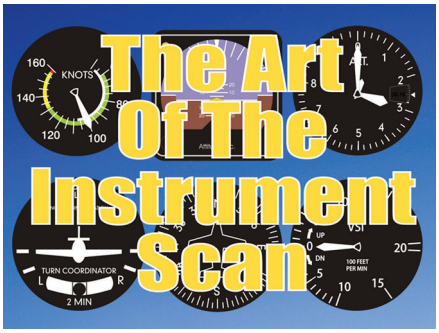
Rod Machado's eLearning Courses



Would you like to try a fun, new and exciting way to learn? Then purchase one of Rod Machado's *Interactive eLearning Courses*.

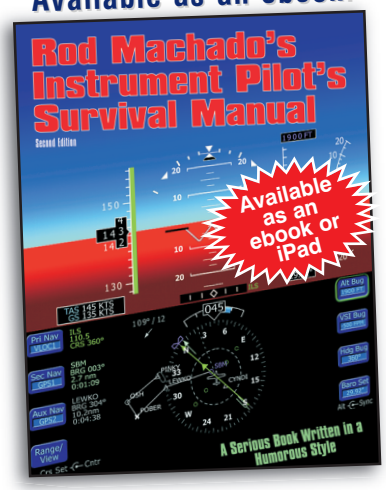
Each course is narrated and accompanied by interesting graphics, animations, videos and educational interactions. In addition, each section within a course is accompanied by questions to help test your knowledge and reinforce important concepts. Of course, if questions aren't your thing, then simply skip them and continue with the course. While this course can be viewed on an iPhone or Android phone, the graphics would be difficult to see (unless you are an ant). These courses were designed to be used on an iPad, Android tablet device, laptop or desktop computer. Check them out at: rodmachdo.com.





Rod Machado's Instrument Pilot's Survival Manual

Available as an ebook!



Third Edition-eBook Only

Rod Machado's *Instrument Pilot's Survival Manual* is written to answer the instrument pilot's most important and frequently unanswered questions. For the price of one hour's worth of dual you will learn the following:

1. How GPS approaches are constructed and how to fly them
2. How to differentiate between benign cumulus clouds and those that can damage an airplane
3. How to measure flight visibility at DA & MDA
4. A unique three-step method of scanning your instruments
5. Secrets of using Jeppesen and NACO charts
6. Using Center radar, ASR-9 radar, NEXRAD and Stormscope (sferics) to avoid thunderstorm and icing conditions
7. New ways of thinking about the IFR system and managing cockpit resources and much more!

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Aviation Humor Video/DVD

Laugh along with over 2,000 pilots as Rod delights and entertains his audience with some of the best of his aviation stories. As a professional humorist, Rod has always been known for his ability to move people off the edge of their seats and onto the floor with his fast paced, humorous presentations. As Scott Spangler, Editor of *Flight Training* magazine says, ".. Get a copy of Aviation Humor. It's Rod Machado at his best. His humor is effective and funny because it strikes at the truth pilots seldom admit, such as the pride a new pilot feels when he uses his certificate as identification when cashing a check and the clerk asks, 'What is that?' If you're in need of a good laugh, get this video. You won't regret it. "After so many requests for a video version of his very popular audio tapes, this video of Rod's is sure to be a popular addition to your library. Funny, Funny stuff!

Aviation Humor - $29.95 Approximate Length 1:00

Rod Machado's Plane Talk

The Mental Art of Flying an Airplane

You'll Learn, You'll Laugh, You'll Remember!

Welcome to a collection of Rod Machado's most popular aviation articles and stories from the last 15 years. *Rod Machado's Plane Talk* contains nearly 100 flights of fun and knowledge that will stimulate your aviation brain and tickle your funny bone. In addition to the educational topics listed below, you'll read about higher learning, the value of aviation history, aviation literature, aviation art and how an artist's perspective can help you better understand weather. You'll also find more than a few articles written just to make you laugh.

In this book you'll discover...

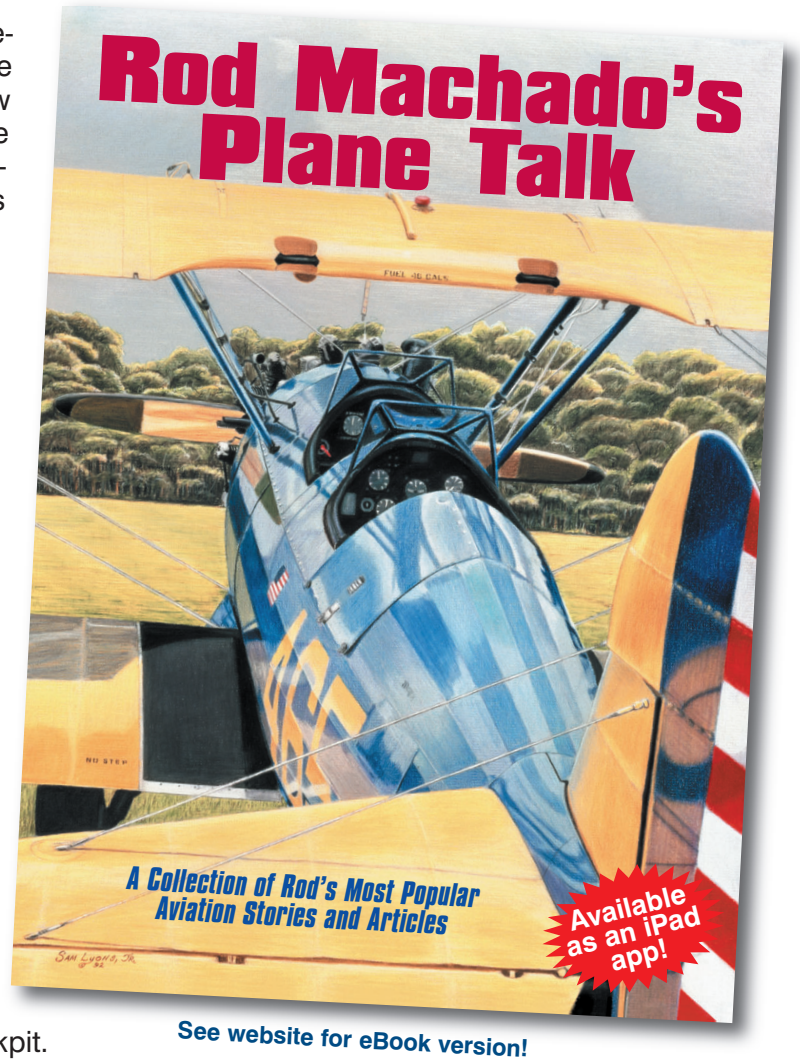
How to Assess and Manage Aviation Risks
Learn how safe pilots think, how to apply the safety strategy used by General Jimmy Doolittle (known as the master of the calculated risk), how famed gunfighter Wyatt Earp can help you cope with aviation's risks, how misleading aviation statistics can be and why flying isn't as dangerous as some folks say it is.

Several Techniques for Making Better Cockpit Decisions
Discover how to use your inner copilot in the cockpit and the value of one good question asked upside down.

New Ways to Help You Cope With Temptation
Fly safer by developing an aviation code of ethics, understand how human nature can trick you into flying beyond your limits, why good pilots are prejudiced and how a concept like honor will protect you while aloft.

How to Use Your Brain for a Change
You can learn faster by understanding how the learning curve—the brain's performance chart—is affected by the little lies we tell ourselves, the mistakes we need to make, our need to please our instructors, and simulator and memory training.

The Truth About Flying, Anxiety and Fear
Learn why it's often the safest of pilots that make excuses instead of flights, why anxiety should be treated as a normal part of flying, and a three-step process to avoiding panic in the cockpit.



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Discover how to behave around new passengers, how to avoid most common mistakes that scare passengers in airplanes and how to reduce the cockpit stress between pilot and spouse.

Favorite Skills Used By Good Pilots
Learn why good pilots scan behind an airplane as well as ahead of it, are sometimes rough and bully-like on the flight controls, occasionally fly without using any of the airplane's electronic navigation equipment, don't worry about turbulence breaking their airplanes, master airspeed control as a means of making better landings and much more.

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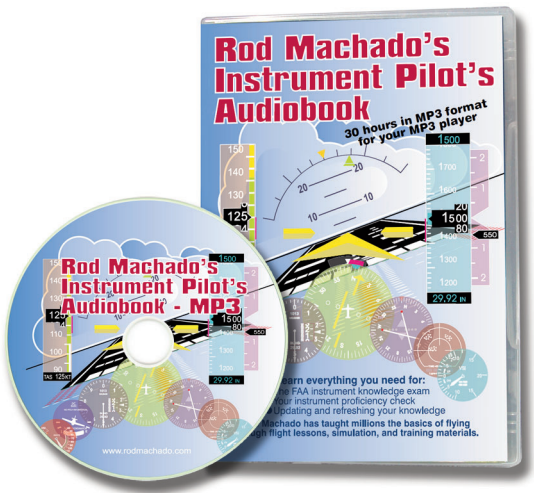
Rod Machado's How to Fly an Airplane Handbook



Rod Machado's Instrument Pilot Audiobook in MP3 Format

Now you can enjoy Rod's popular *Instrument Pilot's Handbook* during your daily commute or at home in the comfort of your own chair. This audiobook is a 30 hour narration of the *Instrument Pilot Handbook* by Rod Machado.

While you can listen to the first ten chapters of the book without referring to the text, you'll still want to use the actual *Instrument Pilot's Handbook* as a reference for reviewing pictures, graphs and many of the incidental ASRS stories scattered throughout the text. This exciting audiobook is the key to learning quickly and efficiently while maximizing use of your scarce time.

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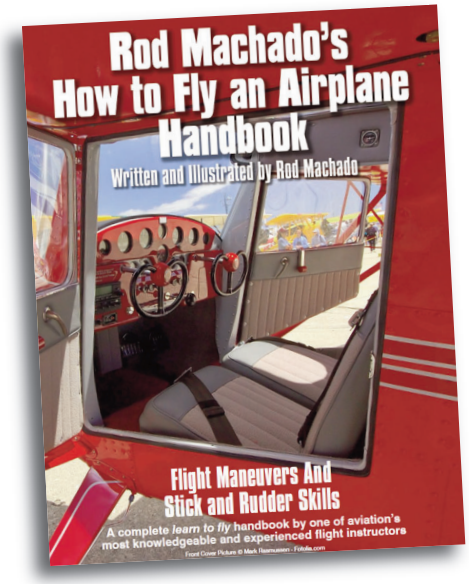


Book-$59.95/eBook-$44.95

Rod Machado's How to Fly an Airplane Handbook & Audiobook

Rod Machado's *How to Fly an Airplane Handbook* (or audiobook recorded by Rod Machado) is a full color, 597 page softbound handbook. It contains all the information you need to learn the physical skills associated with flying an airplane. The book was written to help all pilots learn the basic maneuvers for flying an airplane as well as helping already rated pilots improve their stick and rudder skills.

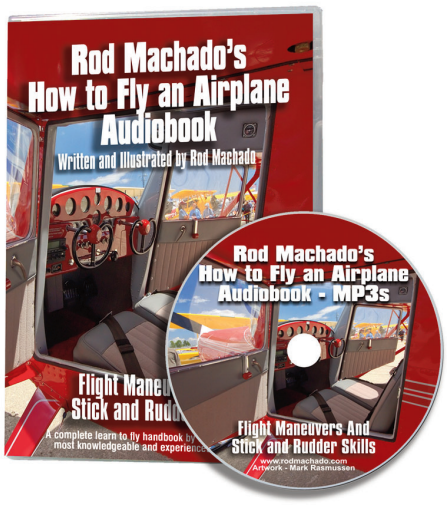
This handbook contains the information necessary to:

- Learn the basic fundamentals of flying any airplane.
- Make flight training easier, less expensive and more enjoyable.
- Master all the private and commercial checkride maneuvers.
- Learn the "stick and rudder" philosophy of flying an airplane.
- Prevent an airplane from accidentally stalling and spinning.
- Allow you to learn to land an airplane quickly and enjoyably.
- Make you a better instructor by providing unique teaching strategies and explanations for student training.

These pages include:

- Practical flying skills that rely on sights, sounds and touch.
- The theory and practice of attitude flying for pilots of all levels.
- Multiple strategies for evaluating the roundout and flare.
- Multiple methods for controlling the airplane's glidepath.
- Strategies for evaluating the desired landing spot.
- Techniques for flying ground reference maneuvers.
- Handling bounces, floating, porpoising and ballooning.
- Wisdom and insights based on practical flying experience.
- Complex airplane operations, night flying, traffic pattern operations, slow flight, stall and spin recognition and recovery, and much more.

With this book you are ensured an enjoyable learning experience and quality instruction.



Audiobook DVD w/MP3 files - $89.95 Download Version - $69.95

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Rod Machado's Instrument Pilot's Handbook

See website for eBook version!

ROD MACHADO'S Instrument Pilot's Handbook

656 Full Color Pages - Hardbound - $74.95, ebook $49.45

Rod Machado's Instrument Pilot's Handbook is a teaching tour de force that takes pilots through the complex world of instrument flying.

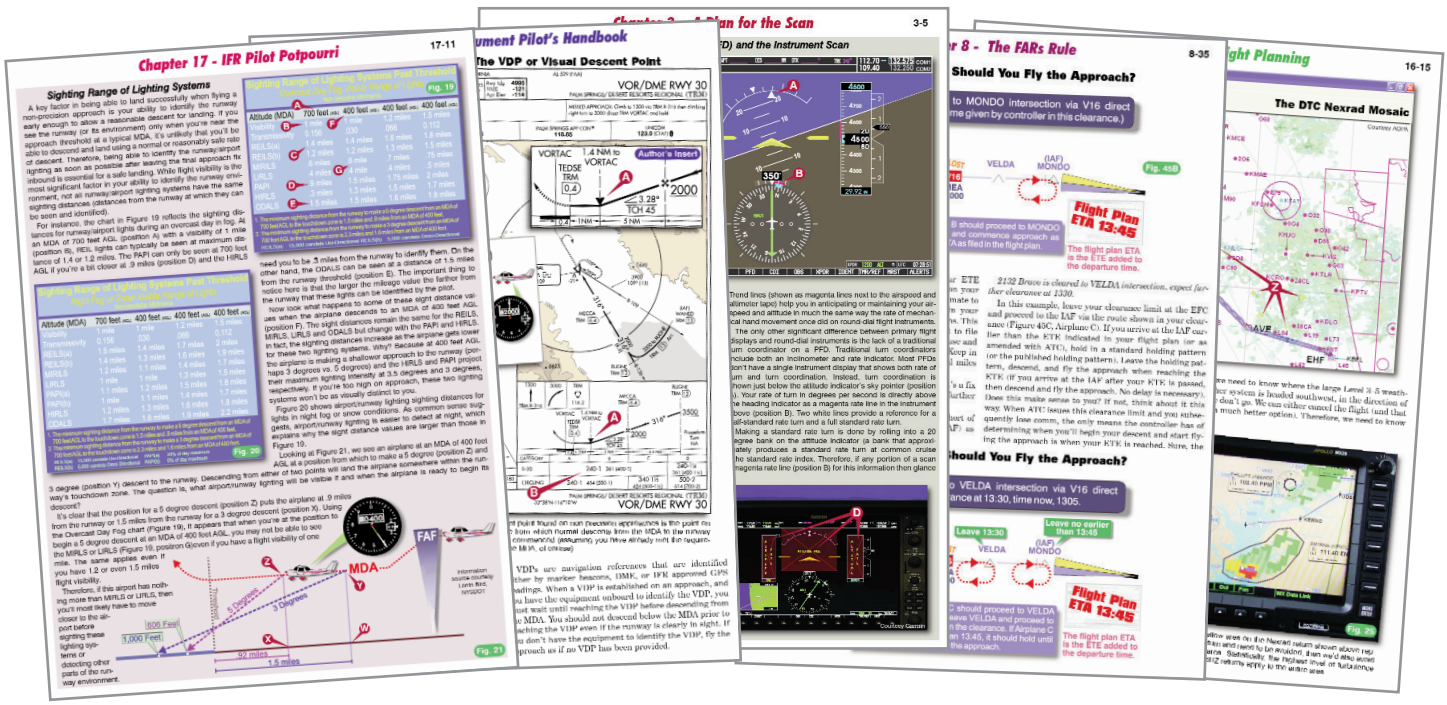
Long known for his unique ability to transform difficult concepts into simple-yet-complete explanations, Machado takes both new and experienced IFR pilots on a guided tour of instrument flying, from the basics through subtleties that even many professional pilots will find useful. He turns complexity into curiosity. Nearly 1,000 illustrations shine further light on the topic at hand.

From how the basic aircraft instruments really work through what's inside a thunderstorm and how a GPS approach works, Machado teaches IFR pilots not just the minimum needed to pass the instrument pilot written exam, but every aspect of IFR flying. This up-to-date text covers the latest information on GPS, glass cockpits, data uplinks, computer-based resources, and other new (and future) technologies and techniques. It is also a rich source of practical information about how real pilots really fly IFR. Readers learn how to gauge the thunderstorm potential of a cumulus cloud by estimating the rainfall rate, scan their instruments in a way that provides maximum performance with minimum effort, and keep the needle centered during an ILS or LPV approach by using the sky pointer on the attitude indicator.

There's flying by the book, and then there's flying by THIS book. *Rod Machado's Instrument Pilot's Handbook* is fun, thorough, and the next best thing to having Rod Machado sit by a pilot's side and talk him through each topic. Once again, Machado proves that you can have fun while learning what you need to know in order to fly safely.

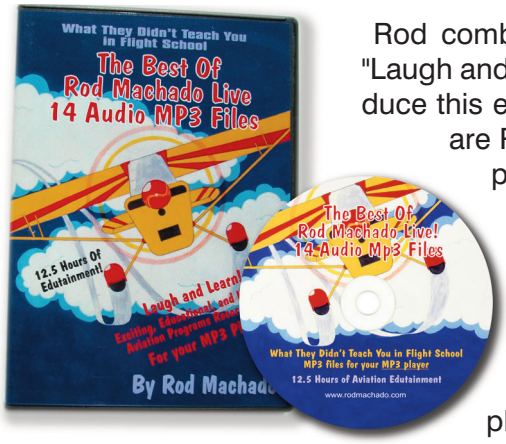
As a comprehensive information source book, these pages include:

- Simplification of the FAA's instrument scan concepts and an easy-to-use, cockpit-practical instrument scan technique
- Latest information on aviation decision making for instrument pilots
- Detailed understanding of analog and glass (PFD) flight instruments
- Detailed procedures for planning an IFR cross-country flight
- Easy to apply navigation methods for VOR, GPS, ADF and for flying approaches to LPV, LNAV, LNAV/VNAV minimums
- Clear, down-to-earth explanations of pertinent FARs, including instrument currency, lost comm, alternate requirements, etc.
- Step-by-step explanation of how instrument approach charts are constructed, including MDAs, DAs, procedure turns, etc.
- Practical understanding of the IFR system, GPS procedures, icing and thunderstorm avoidance, NEXRAD, RADAR. etc.



Rod Machado's Live Audio Lectures and Ordering

The Best of Rod Machado Live in MP3 Format



Rod combined 10 of his best "live audience" recordings from the original "Laugh and Learn" tape series and added four additional live recordings to produce this exciting 14 program set (12.5 hours of recorded material). Included are Rod's popular *Handling In-flight Emergencies* seminar and his latest programs on defensive flying, the art of flying, the nonpilot's guide to landing an airplane, and three additional live programs containing some of Rod's funniest standup aviation humor. You can laugh and learn while driving, gardening, or building your own plane. DVD contains files in MP3 format that are transferred to your MP3 player via computer for use.

Download MP3 Version $24.95

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*(% Humor content / % Information content)

"Rod has a wonderful sense of humor that will keep you in stitches and when you're done laughing, you'll be amazed at how much you've learned."
John & Martha King, King Video

"Mary Poppins once sang, 'A spoon full of sugar helps the medicine go down.' Rod Machado goes one step further by sugar coating invaluable aeronautical wisdom with entertaining wit and humor."
Barry Schiff, TWA Captain/Noted Author

How to Order? Visit www.rodmachado.com