

# **AFS-600**

*Regulatory Support Division*

Vol. 16, No. 4

**OCTOBER 2004**

A quarterly publication designed to serve the Examiner, Designee, and Instructor Community.

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## **MORE CFI RENEWAL CONCERNS**

Paul,

In the July Designee Update, Mr. Cirone wrote of his concerns with the process of the CFI renewal. I strongly agree with his comments. The missing areas of operation are, indeed, the ones that really need to be tested.

In our office, DPE's must report to us any applicant who fails any test for the third time. We do the next test and usually wind up doing a 44709 check on the instructor. In most cases, the instructor has been renewing through a FIRC or online. While most can teach a person to fly, their applicants never make it to the airplane because they haven't had the necessary ground training. I think this backs up what Mr. Cirone says. Most definitely an area to be fixed. I know FIRC's and the online program won't ever go away, but it would be nice to only allow it once or twice. In other words, if you're not actively teaching, let the certificate go!

Thanks for the input opportunity.

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## PROFICIENCY VS DEMONSTRATION

### THE QUESTION

Dear Mr. Maenza,

I recently attended a DPE seminar and asked those who were CFI DPE's how they interpreted the difference between "proficiency" and "demonstration." No answers I got were the same. **Can you help by telling me what the intent is and where I can find a reference (something like the preamble for regs) which clearly spells out the intended difference?.**

I do not find that the explanation in the CFI PTS intro is clear. Many of the same words are used but in different order. When you look at the actual objectives, 3 and 4 are identical in these areas.

Both demonstration and proficiency require with some differences in wording that the CFI applicant should be able to do these maneuvers, explain them, with an intent of teaching them.

I am not a CFI DPE but do train applicants. Thank you in advance for your help.

Thank you,  
Lyn Carlson WP05-203

### THE ANSWER

Dear Mr. Carlson:

A "proficiency" maneuver as listed in the CFI PTS, is a maneuver that must be performed satisfactorily to Practical Test Standards by applicants for the private and/or commercial pilot certification. These maneuvers are listed as TASKS in the appropriate private and commercial PTS. A flight instructor applicant must be able to teach private and commercial pilot applicants these TASKS, and will be tested in this area using the CFI PTS, with the emphasis on instructional knowledge and the ability to perform the maneuvers to at least the appropriate Practical Test Standards.

A "demonstration" maneuver as listed in the CFI PTS, is a maneuver that is unique to the CFI PTS. Applicants for private and/or commercial pilot certificates are not required to perform these maneuvers on practical tests because the maneuvers are not listed as TASKS in either the private or commercial PTS. The flight instructor applicant however, must show that he/she is able to explain and demonstrate these maneuvers on the CFI practical test; this is for student pilot familiarization and stall awareness purposes. The CFI applicant however, will not be required to show that he/she can teach private and/or commercial pilot applicants these maneuvers to a particular standard.

Thomas J. Forchtner  
Certification Manager, AFS-630

## INSTRUMENT RATING IN ADVANCED TECHNOLOGY AIRPLANES

Paul:

Greetings. I conducted an IRA-ASEL Practical in a new T-182 with the Garmin 1000 last week. It is, to be sure, an amazing piece of equipment, but a challenge to anyone lacking experience. Luckily, I have the benefit of flying glass/FMC/FMS/GPS in my 'real' job, so the glass integration concept, FMC

uses, autopilot, Flight Management System coordination and system knowledge are decent. Also, thanks to a generous owner I had many hours' unrestricted access to the aircraft, some ground power, the Garmin guide and the Cessna POH prior to the check ride, as well as the Garmin-produced 'Guidance for DPE's and Instructors' (which fills in many systems questions and 'secret handshake' things left open by the POH and Garmin guide).

If there is one suggestion you might pass on in the DPE program, to supplement the advanced cockpit guidance that you issued last year, it should be that no DPE should attempt to administer *any* practical test (and, conversely, no CFI-I should provide any instruction) in any of the new avionics generation aircraft without a *thorough knowledge* of the systems, navigation and systems integration, FMC/FMS, autopilot, as well as the many cautions, warnings and advisements scattered throughout the POH and Garmin guide. This is not your father's Cessna; one cannot just get in and go. Frankly, one should not even start the engine without good systems knowledge. For instance,

...the *pre-exterior* inspection checklist and before start checklist each have numerous, critical mandatory items, i.e. cooling fan (there are 4) operational and functional check (one feels for airflow); a 20-second standby battery system check; voltage checks on the S,M, and E systems (and knowing those is part of the trick); AHRS alignment check; setting three (3) separate altimeters, etc.

...a 'Caution' in the POH that states IFR flight using the Garmin 1000 system should not be attempted without a thorough knowledge—I daresay mastery--of the autopilot system, including Nav coupling, altitude preselect, vertical speed, etc. (Frankly, common sense should expand that to include VFR flight.)

...the Caution and Alert system built into the Garmin PFD is very close to the full-blown EICAS system found in Boeings, with three levels of visual alerts, and at least two levels of aural alerts.

...failure of the No. 2 GPS is not annunciated, though failure of GPS No 1. is.

That is just a sample of the information that a CFI/DPE could glean from the books, and might want to know for a check ride or instruction.

As I said, not your father's Cessna.

Though not yet effective, I could not ignore the comments and guidance in the new IRA PTS regarding the advanced cockpit systems for this check ride. Obviously, I could not apply those guidelines specifically before the effective date. However, they were an excellent starting point/reference for applying the current PTS. You seem to have covered the issues for advanced cockpits and Nav systems well in the new IRA PTS preamble and comments, particularly the requirement—or is it discretionary?—for one non-precision approach to be conducted on the autopilot. The systems questions on the Garmin 1000 alone took up quite a bit of time in the oral portion, much more so than the usual systems questions. However, it seemed, and still seems, necessary to determine the applicant's knowledge of the equipment, and the technical requirements and challenges that equipment poses at that level, as part of any thorough practical.

The good news is that the Garmin DPE/CFI-I guidance handout is excellent, and everything worked as indicated. The AHRS and ADC CB's are prominent and make the part-panel using the standby instruments quite realistic. In addition, the AHRS, ADC and magnetometer re-align and come to life quickly when power is restored, as advertised.

In summary, you might want to suggest to any CFI-I or DPE working with the Garmin1000 to do his or her homework before diving in.

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## IMPROVING PILOT QUALITY

Paul:

I have been a pilot examiner for twenty-five years and a career flight instructor for thirty-nine years with close to 18,000 flight hours of which more than 13,000 are dual given. I also estimate that I have conducted more than 4000 flight tests. As such I am responding to your recent article in the Designee Update of July 2004.

While I believe that we can improve the Pilot Examiner Program, I don't believe that it can be done without facing the problem that exists in flight training today. This problem is very simple. The flight schools and a majority of the flight instructors today no longer train people to be good pilots. They train them to pass a flight test. The simple fact is this; if a maneuver is not contained in the PTS, it is not taught or used in flight training. The same thing applies to the ground schools. If it is not on the knowledge test, it is not taught.

To satisfy myself about this, about a year ago I researched the curriculum of one of the largest and most famous flight schools in the country and I could not find one thing that was included in it that was not in the PTS or the Knowledge Test. I also researched one of the more famous of the line ground schools, and could find no subject matter that did not directly address a question on the Knowledge Test.

I happen to live in an area that has two of the finest law schools in the country. A high-ranking professor in one of them was a student of mine. I posed this question to him. How long would it take to prepare a reasonably intelligent individual with no training in the law to pass the Bar Exam? His answer was shocking. Four months. Imagine how good a lawyer that individual would be. Well, that is where a majority of our flight training is today.

Unfortunately nothing in the present Pilot Examiner program can correct this. We must do something to force the training environment to train our prospective pilots to be good and safe pilots and not just test takers.

I could write a book on possible ways to do this, but I will make only one suggestion here as a start. Require flight instructors to be knowledgeable on all the maneuvers appropriate to their ratings that are contained in the Airplane Flying Handbook. Then, allow the Pilot Examiners to use maneuvers not contained in the PTS and even give some instruction in such maneuvers. If the examiner determines that the applicant has not received training outside the PTS it could be the basis for a failure.

I admit I have not thought this idea through, but I think the concept could have some merit.

If you would like me to offer other better thought out ideas, please let me know. I am vitally concerned about the quality of students that we examiners see, but still meet standards.

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## SPORT PILOT PROGRAM

The Sport Pilot program is moving along at a rapid rate. Many questions have come in to the Light Sport Aviation Branch (AFS-610) asking about dates for implementation of the pilot and sport pilot examiner programs. Right now we are working on the policy and guidance for both flight instructors and designated pilot examiners in order to make this program successful. Even though the regulation went into effect on September 1<sup>st</sup>, we are still not ready to issue privileges or ratings associated with the rule.

All flight instructors and designated pilot examiners should review 14 CFR sections 61.413, 61.415, 61.419, 61.423, and 61.429. These sections contain very important information if you are going to participate in the

sport pilot program. You need to note that some of the activities cannot start until January 15<sup>th</sup>, 2005. For example section 61.423(b) requires that the flight instructor conducting proficiency checks at the pilot or flight instructor level allowing for additional sport pilot category/class privileges will need to submit the application to the airman registry within 10 days. The first hurdle, that is the application, is not available nor will be available to the public until January 15th. The new airman application, FAA Form 8710-11, will be for solo use of sport pilot and flight instructor certification. The second hurdle is the airman registry will not accept applications prior to January 15th, 2005. So in other words you cannot conduct a proficiency check for sport pilot or flight instructor privileges until January 15th, 2005. Additionally, a revised Advisory Circular 61.65, Certification: Pilots and Flight and Ground Instructors, establishing guidance for all these activities will not be available until January 2005.

The sport pilot examiner program policy and procedures are under development. The new handbook will contain guidance for the Flight Standards District Offices to authorize sport pilot privileges to existing designated pilot examiners (DPEs). Once this handbook guidance is available existing DPE's will not be able to conduct any sport pilot evaluations until January 15th, 2005, again because the application will not be available. The new sport pilot examiner (SPE) program will start accepting applications on the new FAA Form 8710.12 in early October. A new Light-Sport Standardization Board (LSSB) will be in place to evaluate the applications and establish eligibility of the new candidates. A separate knowledge test for sport pilot examiners will be available for those candidates notified by a letter from the LSSB. It is anticipated to have the first class for the SPE program in January 2005.

The new sport pilot practical test standards (PTS's) will be available to the public in November. These practical test standards will be used for all pilot and flight instructor evaluations conducted for sport pilot level privileges. These PTS's will also be used for proficiency checks conducted by flight instructors to meet the requirements of 14 CFR sections 61.312 and 61.419. There will also be a new PTS for private pilot weight-shift controlled and powered parachute evaluations.

New airman knowledge tests have been developed and will be available on November 15<sup>th</sup>. There will be a generic test for the sport pilot certificate that will contain forty questions. The subjects contained in this test are listed in 14 CFR 61.309. The flight instructor level knowledge tests will be by category (airplane, glider, gyroplane, lighter-than-air balloon, lighter-than air, airship, weight-shift controlled and powered parachute). The flight instructor level tests contain seventy questions. There will also be seven new tests for sport pilot examiner candidates. They are also by category. We have added additional knowledge tests at the private pilot level for weight-shift controlled and powered parachute.

In order to find out the latest information concerning the status of the sport pilot program you can check the [afs600.faa.gov](http://afs600.faa.gov) web site under Light Sport Aviation (AFS-610). We will continuously update the web site as the various documents and forms become available. If you have any specific questions you may contact the Light Sport Aviation Branch at 405-954-6400 or e-mail [afs610comments@faa.gov](mailto:afs610comments@faa.gov). We are working diligently to get this program on the road. Sometimes patience is the best medicine.

Martin Weaver  
Manager, Light Sport Aviation Branch

**CARBURETOR ICE**

Since engine power loss resulting from an accumulation of carburetor ice continues to be a leading cause of accidents/incidents, it is important that pilots and flight instructors be aware of factors related to carburetor management.

The Flight Training Handbook (AC 61-21A), which was superseded in 1999 by the Airplane Flying Handbook (FAA-H-8083-3), states in Chapter 2, INTRODUCTION TO AIRPLANES AND ENGINES, Fuel/Air Mixture Control (Page 19), that:

1) "Gasoline will not burn unless it is first mixed with air (oxygen) in the proper proportion. Thus, 12 pounds of air and 1 pound of fuel may be described as an air/fuel ratio of 12:1. Mixtures as rich as 8:1 and as lean as 16:1 will burn in the cylinder of an engine that develops maximum power with about a 12:1 ratio."

Combustion is a chemical reaction described as rapid oxidation (the union of oxygen with a substance). The only difference between a piece of metal rusting and gasoline vapors burning is the amount of time it takes for the oxidation to take place. The most basic hydrocarbon, Methane (CH<sub>4</sub>), when chemically combined at the correct weight ratio with Oxygen (O<sub>2</sub>), results in the formation of two new substances, Water (H<sub>2</sub>O) and Carbon Dioxide (CO<sub>2</sub>), plus a lot of heat energy. An aircraft contrail is simply a visible cloud of water vapor exhausted from the engine(s) into the cold atmosphere.

2) "As the airplane climbs higher and higher and the fuel/air mixture becomes richer, the excessive fuel causes the engine to lose power and to run rougher and rougher."

When air passes through the throat (venturi) of a carburetor, it creates a lower pressure that siphons fuel into the airflow through a metering nozzle. The throttle valve regulates the volume of air that flows through the carburetor and the volume of air determines the volume of fuel being metered. Even if Helium (an inert gas that won't support combustion) was substituted for air, the volume of Helium would determine the volume of fuel being metered. Although the mixture won't burn in the cylinders, the carburetor has done its job of metering the fuel according to the volume of Helium.

Therefore, if the volume of fuel is always *metered* by the volume of air determined by the throttle opening, the carburetor must be set up to insure that the ratio of air/fuel by weight is optimal (i.e. 12:1) at full rich in a standard sea level atmosphere (15° C and 29.92" Hg). Once the initial setup is made, the only time the air/fuel ratio will ever be at 12:1 at full rich is when the airplane is in a standard atmosphere at sea level. Whenever the atmosphere is more dense than standard (>29.92" Hg and/or <15° C), the air/fuel mixture will be leaner than 12:1. Whenever the atmosphere is less dense than standard (<29.92" Hg and/or >15° C), the air/fuel mixture will be richer than 12:1.

When operating an aircraft with a normally aspirated, carbureted engine from an airport at a standard sea level atmosphere the BEFORE TAKEOFF checklist calls for *CARB HEAT . . . APPLY (Check for RPM drop)*.

What causes the RPM drop?

If the throttle is not moved, the volume of air flowing through the carburetor will not change and the amount (volume) of fuel being metered will not change. The only thing that changes is the density of the heated air entering the carburetor. Since the weight of the air is decreased (fewer molecules of oxygen per volume) and mixed with the same weight of fuel (same molecules per volume), the mixture ratio becomes richer (<12:1). The engine runs rougher and loses power (RPM). This RPM loss can be recovered while carburetor heat is ON by moving the manual mixture control toward a leaner setting to move the mixture ratio back toward the original value of 12:1.

What else should the pilot be looking for while carburetor heat is ON?

After a drop in RPM is noted, continue to observe the tachometer to detect a possible increase in RPM that would indicate carburetor ice was present and was melted by the application of the heated air. An excellent

article, "[Carb Ice Versus Carb Heat](#)", written by an FAA Aviation Safety Councilor Pete Humphrey, offers an excellent discussion on the subject.

As pilots become more familiar with the fact that a carburetor meters fuel by volume, and that a mixture ratio is a product of molecular weights per unit of volume, other scenarios will be easier and safer to deal with.

Scenario #1: The aircraft is operating from a sea level airport on a hot and humid summer day.

The density altitude may be near 3000' MSL. Therefore, the mixture ratio has moved from 12:1 (optimal) toward a richer 8:1 (limit) before the aircraft leaves the ground and the engine will not develop maximum power for takeoff at a full rich setting. When the aircraft is climbed to 3000' MSL and flown to the practice area to do some air work (stalls, slow flight, etc.) the mixture ratio could be nearing a density altitude of 6000' MSL. Some flight instructors recommend that their less experienced pilots not lean the mixture unless climbing above 3000' MSL, especially when they will be making some major power changes during the practice session. When the pilot applies carburetor heat at a density altitude of 6000' MSL, he/she essentially moves the mixture ratio further away from 12:1 toward the richer 8:1 (limit) and increases the possibility that the engine won't respond to an application of power due to the excessively rich mixture.

Scenario #2: That same pilot may observe an RPM drop that he/she interprets as possibly being caused by formation of Carburetor ice.

[Mr. Humphrey's article](#) states "when carburetor ice particles form a deposit on the throttle plate, the carburetor can become choked up by this ice to the point that the engine receives less air than is required for full power. The once explosive mixture becomes so rich from excess fuel that the engine ceases to fire."

If the engine is already at a density altitude of 6000' MSL and carburetor ice causes it to run even richer, the application of carburetor heat increases the density altitude to a point where the mixture ratio may fall below the 8:1 limit and cause the engine to quit running. Adjusting the mixture ratio with the manual mixture control prior to application of carburetor heat will bring it back toward the optimal of 12:1 to help keep the engine running and develop more exhaust heat to be used for deicing the carburetor. This prevents the "catch 22" of "The more heat you need, the less you have; thus, the more you need".

More instruction should be devoted to the need for pilots to better understand the relationship of mixture management, not only as it relates to fuel economy in cruise flight, but to all aspects of carburetor management to deal with varying densities of air flowing through a carburetor. Whether the change in air density is related to non-standard temperatures, barometric pressures, airport and cruising altitudes, or a poorly adjusted carburetor, the pilot should be prepared to adjust the manual mixture control to keep the mixture ratio as close to optimal (12:1 for maximum power) using whatever indication of proper mixture ratio (EGT, etc.) recommended by the manufacturer for various phases of flight (takeoff, climb, cruise, etc.).

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**IACRA – THE DIGITAL SOLUTION TO AIRMAN CERTIFICATION!**

The FAA announces the formal rollout of web-based software for Airman Certificate Applications. The Integrated Airman Certification and/or Rating Application (IACRA) electronically captures and validates airman information required to complete the airman application and the other certification documents including the appropriate temporary airman certificate and knowledge test results. IACRA can be accessed from any location with Internet connectivity. There are no items to download so it is burden free!

IACRA replaces the “ACRA CD”, a stand-alone computer based PC program that initially automated the application process allowing the user to enter data in a rules-based program and then print out the completed form for mailing. IACRA integrates critical elements of multiple FAA program databases. During data entry, IACRA automatically ensures that applicants meet regulatory and policy requirements real time. It then uses digital signatures throughout the certification process in order to verify that no data is changed. Finally, the application is electronically forwarded to the Airman Registry for final processing. No paper!

IACRA currently supports Student Pilot through Airline Transport Pilot, CFI renewals, 141 schools, and 142 training centers. Future certificates supported include sport pilot, airworthiness, and letter of authorizations.

The FAA has completed agency training of the IACRA application and all Regions are now authorized to use the software. The FAA also provides help desk support on the IACRA application. The help desk can be reached via phone or email. Users also have an opportunity to provide comments, feedback and suggestions via a link on the IACRA website. For contact numbers, the latest news and Frequently Asked Questions (FAQs) on IACRA, go to <http://acra.faa.gov>.

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