Airman Certification Standards

What, Why, How?

Presented to: Applicants, Instructors, Evaluators

By: Federal Aviation Administration

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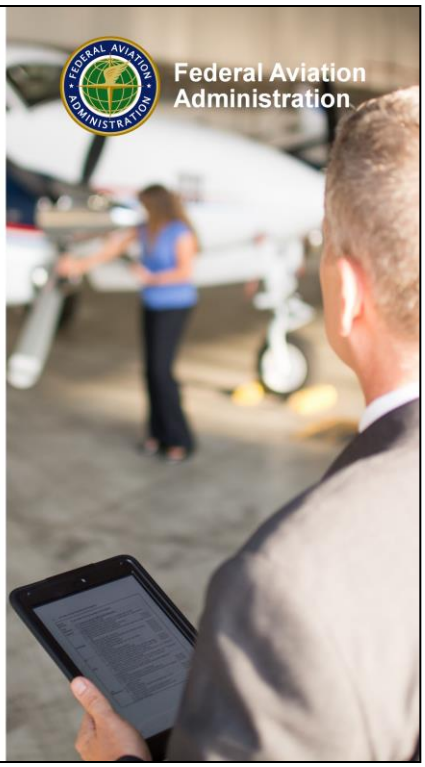

Welcome! On June 15, 2016, the FAA replaced the Practical Test Standards for the Private Pilot Airplane certificate and the Instrument-Airplane rating with the corresponding Airman Certification Standards, or ACS. This presentation provides information and instructions on using the ACS.

Overview

- What is the ACS?
- Why change?
- How is it better?
- What do I need to know?
- How do I use the ACS?
- What's the story on slow flight?
- What's next for the ACS?
- Where can I get more information?

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Here are the topics we'll cover.

What is the ACS?

- **A**irman **C**ertification **S**tandards
  - "Enhanced" version of the Practical Test Standards (PTS) – ACS replaces the PTS
  - Adds task-specific knowledge and risk management elements to each PTS Area of Operation/Task
  - Result:
    - Integrated presentation of specific knowledge, risk management, and skill elements for each Task
    - Single source set of standards for both knowledge exam and the practical test

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U.S. Department of Transportation
Federal Aviation Administration

Private Pilot – Airplane
Airman Certification Standards

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- The ACS is an enhanced version of the PTS. The PTS-to-ACS transition started on June 15, 2016.

- The ACS adds task-specific knowledge and risk management elements to each PTS Area of Operation/Task. The result is an integrated presentation of specific knowledge, risk management, and skill elements for each Task.

- The ACS thus provides a single-source set of the standards for both the knowledge exam and the practical test.

Why make this change?

- ACS started in 2011 as a way to fix knowledge testing.
- FAA and industry partners determined the need for a systematic approach that would:
  - Provide clear standards for aeronautical knowledge
  - List specific behaviors for risk management and ADM
  - Consolidate overlapping tasks in the PTS
  - Tie the many “special emphasis” items to knowledge and skill
  - Connect the standards for knowledge, risk management, and skill to guidance (H-series handbooks), to knowledge test questions, and the practical test

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- The ACS started in 2011 as a way to fix knowledge testing, which was criticized for being out of step with today’s operating environment. We asked for help from the aviation training industry experts whose names you will see later in this course. They started with the idea of a “Knowledge Test Standard,” or KTS, but found that we really needed a systematic approach to the overall airman certification system. We needed to:
- Provide clear standards for the aeronautical knowledge elements listed in the regulations, and make sure that knowledge reflects things airmen really need to know for safe operation in the NAS.
- List specific, observable behaviors for risk management and aeronautical decision-making rather than just words in the introduction of the PTS.
- Consolidate overlapping Tasks in the PTS.
- Tie the many “special emphasis” items listed in the PTS to knowledge and skill.
- And last but not least, we needed to connect the standards for knowledge, risk management, and skill to FAA handbooks, to knowledge test questions, and to the practical test, which is the “final exam” for someone seeking an airman certificate or rating.

How is it better?

Definition & integration of elements = comprehensive standard

Aeronautical knowledge

Task	*Task A. Steep Turns*	
References	FAA-H-8083-2, FAA-H-8083-3; POH/AFM	
Objective	To determine that the applicant exhibits satisfactory knowledge, risk management, and skills associated with steep turns.	
Knowledge	The applicant demonstrates understanding of:	
PA.V.A.K1	1.	Coordinated flight.
PA.V.A.K2	2.	Attitude control at various airspeeds.
PA.V.A.K3	3.	Maneuvering speed, including changes in weight.
PA.V.A.K4	4.	Controlling rate and radius of turn.
PA.V.A.K5	5.	Accelerated stalls.
PA.V.A.K6	6.	Overbanking tendencies.
PA.V.A.K7	7.	Use of trim in a turn.
PA.V.A.K8	8.	Aerodynamics associated with steep turns.
PA.V.A.K9	9.	Aerobatic requirements and limitations.

Know

Aeronautical decision-making and special emphasis

Risk Management	The applicant demonstrates the ability to identify, assess and mitigate risks, encompassing:	
PA.V.A.R1	1.	Dividing attention between airplane control and orientation.
PA.V.A.R2	2.	Task management.
PA.V.A.R3	3.	Energy management.
PA.V.A.R4	4.	Stall/spin awareness.
PA.V.A.R5	5.	Situational awareness.
PA.V.A.R6	6.	Collision avoidance, scanning, obstacle and wire strike avoidance.
PA.V.A.R7	7.	Importance of coordinated flight.

Consider

PTS-based flight proficiency

Skills	The applicant demonstrates the ability to:	
PA.V.A.S1	1.	Establish the manufacturer's recommended airspeed or if one is not stated, a safe airspeed not to exceed V_A.
PA.V.A.S2	2.	Roll into a coordinated 360° steep turn with a 45° bank.
PA.V.A.S3	3.	Perform the task in the opposite direction, as specified by the evaluator.
PA.V.A.S4	4.	Maintain the entry altitude ±100 feet, airspeed ±10 knots, bank and ±5°; and roll out on the entry heading, ±10°.

Do

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- The integrated format of the ACS has a number of benefits.
    - It clearly tells applicants, instructors, and evaluators what an airman must KNOW, CONSIDER, and DO to pass the knowledge test and the practical test for an airman certificate or rating.
    - It shows how the required knowledge, risk management, and skill elements for each Area of Operation/Task are connected.
    - It defines expectations and behaviors for risk management and connects them to specific Tasks.
    - It puts the “special emphasis” items from the PTS in the right context.
- In summary – the ACS approach enhances safety by making tests meaningful and relevant to actual operations and contributes to standardization in teaching and testing these concepts.

How is it better?

Clear & logical presentation

- Often-overlooked introductory material in PTS has been relocated to specifically focused appendices.
- Roles, responsibilities, and expectations are clearly defined.
- Lengthy notes in individual PTS Tasks have been integrated into the appropriate Appendix.

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The ACS improves the presentation of important information.

•As you see on the slide:

- Often-overlooked introductory material in the PTS has been relocated to specifically focused appendices.
- Roles, responsibilities, and expectations are clearly defined.
- Lengthy notes in individual PTS Tasks have been integrated into the appropriate appendix.

How is it better?

V. Performance Maneuvers

Task	*Task A. Steep Turns*
References	FAA-H-8083-2, FAA-H-8083-3; POH/AFM
Objective	To determine that the applicant exhibits satisfactory knowledge, risk management, and skills associated with steep turns.
Knowledge	The applicant demonstrates understanding of:
PA.V.A.K1	1. Coordinated flight.
PA.V.A.K2	2. Attitude control at various airspeeds.
PA.V.A.K3	3. Maneuvering speed, including changes in weight.
PA.V.A.K4	4. Controlling rate and radius of turn.
PA.V.A.K5	5. Accelerated stalls.
PA.V.A.K6	6. Overbanking tendencies.
PA.V.A.K7	7. Use of trim in a turn.
PA.V.A.K8	8. Aerodynamics associated with steep turns.
PA.V.A.K9	9. Aerobatic requirements and limitations.
Risk Management	The applicant demonstrates the ability to identify, assess and mitigate risks, encompassing:
PA.V.A.R1	1. Dividing attention between airplane control and orientation.
PA.V.A.R2	2. Task management.
PA.V.A.R3	3. Energy management.
PA.V.A.R4	4. Stall/spin awareness.
PA.V.A.R5	5. Situational awareness.
PA.V.A.R6	6. Collision avoidance, scanning, obstacle and wire strike avoidance.
PA.V.A.R7	7. Importance of coordinated flight.
Skills	The applicant demonstrates the ability to:
PA.V.A.S1	1. Establish the manufacturer's recommended airspeed or if one is not stated, a safe airspeed not to exceed V_A.
PA.V.A.S2	2. Roll into a coordinated 360° steep turn with a 45° bank.
PA.V.A.S3	3. Perform the task in the opposite direction, as specified by the evaluator.
PA.V.A.S4	4. Maintain the entry altitude ±100 feet, airspeed ±10 knots, bank and ±5°, and roll out on the entry heading, ±10°.

ACS coding system

The ACS assigns a unique code to each element of knowledge, risk management, & skill

PA = Private Pilot Airplane (*applicable ACS*)

V = Performance Maneuvers (*Area of Operation*)

A = Steep Turns (*Task*)

K5 = Accelerated Stalls (*Task Element*)

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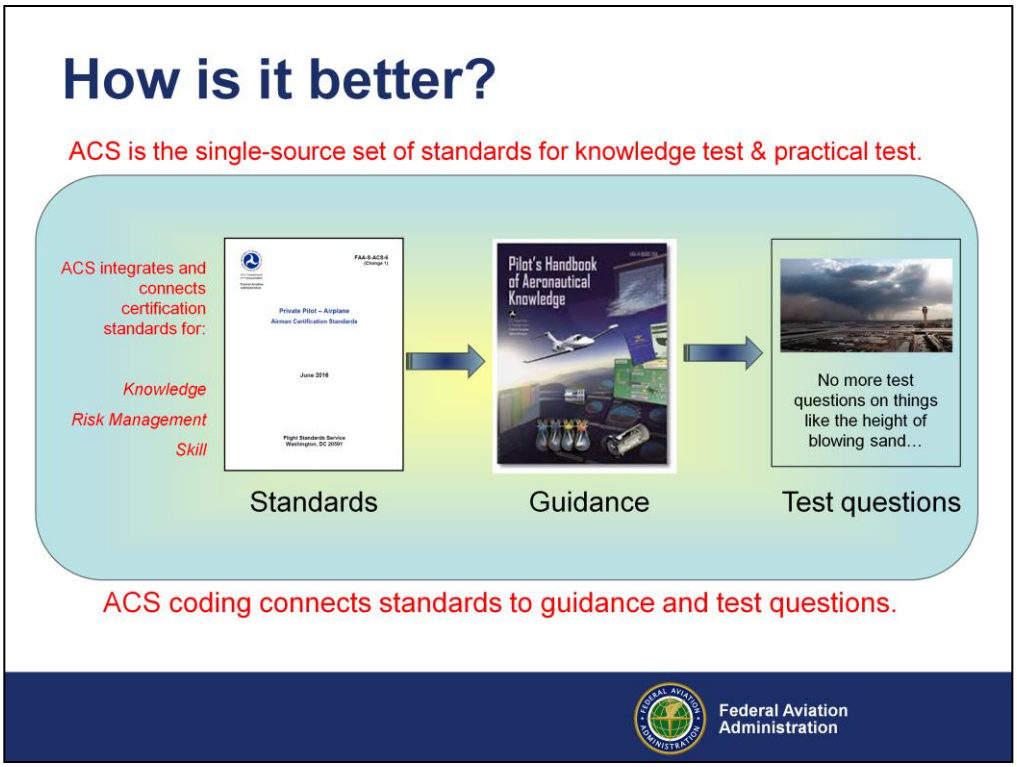
- One of the strongest tools that the industry team developed for the Airman Certification Standards framework is a coding system.
- The ACS assigns a unique code to each element of knowledge, risk management and skill.
- Let's take a look at what PA.V.A.K5 means:
  - **PA** = Private Pilot Airplane (*defines applicable ACS*)
  - **V** = Performance Maneuvers (*defines Area of Operation*)
  - **A** = Steep Turns (*defines Task*)
  - **K5** = Accelerated Stalls (*defines element*)



- The ACS coding system provides the “thread” to link standards to guidance and test questions, and to keep them aligned in the future.
- Later on, this ACS code will replace the LSC, or PLT, code now shown on the Airman Knowledge Test Report.
- Already, though, the industry team has used the ACS coding to help ensure that handbooks are aligned with the standards as defined with the ACS. The FAA is incorporating industry recommendations for a number of these documents.
- Also, the FAA has already used the ACS coding system to revise and align all private pilot airplane and instrument-airplane rating knowledge test questions to the knowledge, skill, and risk management elements in the corresponding ACS.

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How is it better?

ACS benefits from extensive FAA/industry collaboration

- Industry-led development – the ACS has been developed, refined, and tested through three consecutive aviation training industry groups with diverse representation.
- Public comment - the FAA established several dockets for the industry groups to receive public comments on the ACS.
- Prototyping - the FAA and its industry partners conducted ACS prototype activities to test and refine the ACS for private pilot (airplane) and instrument rating (airplane).
  - Private Pilot-Airplane prototyped twice in Orlando
  - Instrument-Airplane prototyped in Seattle and Orlando
  - Feedback was very positive.

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- The ACS reflects a great deal of input from industry experts, and from the public.
- The FAA has now used three groups of industry experts to develop, refine, and test the ACS.
- On behalf of industry working groups, the FAA twice established dockets to receive public feedback on the draft Private, Instrument, and Instructor ACS.
- The working groups used those comments to refine the ACS, and also to develop a set of Frequently Asked Questions for the FAA website.
- Prototype efforts started in the summer of 2014 in Orlando.
- In the fall of 2015, we launched ACS Instrument-Airplane Rating prototype activities in Orlando and in Seattle.
- Feedback from applicants, instructors, evaluators and FSDO inspectors in both locations was very positive.

How is it better?

Current and Past Aviation Community Participants

Aircraft Owners & Pilots Association (AOPA)
Airlines for America
Air Line Pilots Association
AnywhereEducation Inc.
Aviation Accreditation Board International
Aviation Research Training & Services
Aviation Supplies & Academics
CAE
Cessna Pilot Centers
Coalition of Airline Pilots Associations
Embry-Riddle Aeronautical University
Federal Aviation Administration (AFS-200,400,600,800)
Flight Safety International
General Aviation Manufacturers Association
Gleim
Florida Institute of Technology
Jeppesen
King Schools
Liberty University
Mary Schu Aviation
National Air Transportation Association
National Association of Flight Instructors
National Business Aviation Association
Oxford Flying Club
Paul Alp, CFI
Polk State College
Redbird Simulations
Regional Air Cargo Carriers Association
Robert Stewart, CFI
Satcom Direct (Mariellen Couppee)
Society of Aviation and Flight Educators
Sportys Academy
University Aviation Association
University of North Dakota

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- This list includes all past and present working group participants. Essentially, these are the organizations and individuals who created the ACS in close collaboration with the FAA.

What Do I Need to Know?

- With one exception, the ACS does not change the PTS skill tolerances.**
- The ACS does not lengthen either the ground or the flight portion of the practical test.
- The ACS does not make risk management testing more subjective.

** Maneuvering during slow flight

- The ACS does connect specific knowledge and risk management elements to specific skills.
- The ACS does clearly show everyone what the FAA expects for the knowledge exam and the practical test.
- The ACS does mean that anyone using it for training, teaching, or testing will be better prepared not just for certification but for safe operation in the NAS.

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Here are some important points to know.

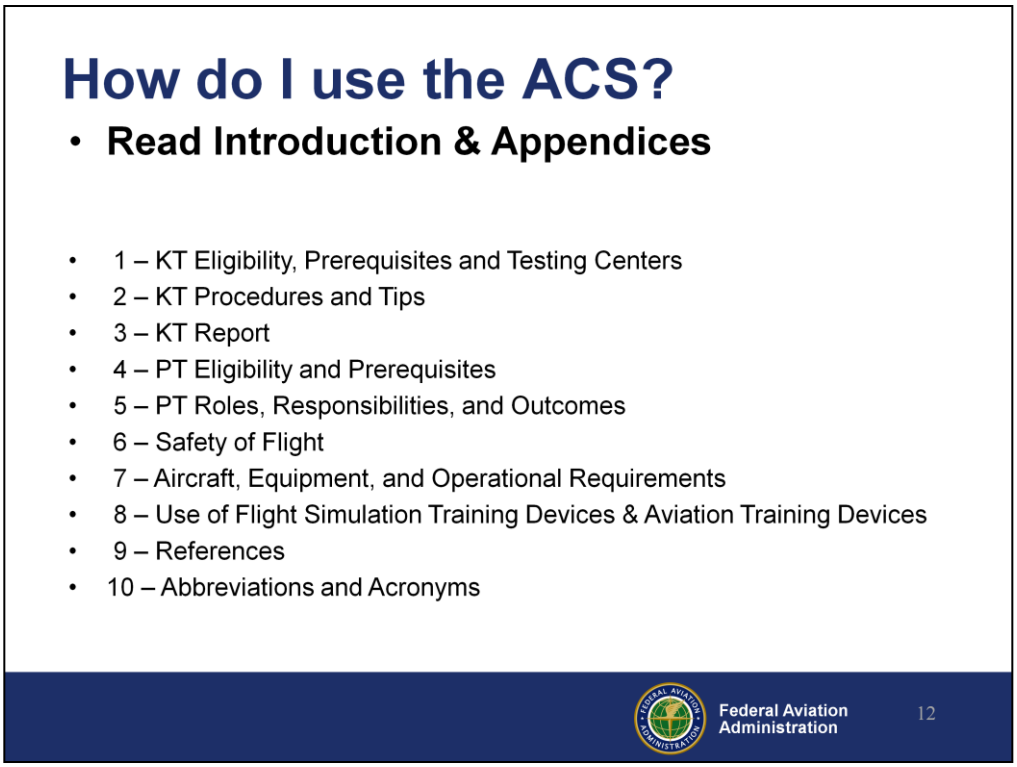
With one exception, the ACS does not change the skill performance metrics in the PTS.

The ACS does not lengthen either the oral or the flight portions of the practical test.

The ACS does connect specific, appropriate knowledge and risk management elements to specific skills.

The ACS does help everyone understand what the FAA expects for the knowledge exam and the practical test.

The ACS does mean that anyone using it for training, teaching, or testing will be better prepared not just for certification but for operating safely.



- The introduction contains important information, both general concepts and instructions on how to use the ACS.
- You also need to carefully review the ACS appendices, which are listed on the screen. Many of the notes and comments that were scattered throughout the PTS have been consolidated into a specific appendix. These notes remain critical to the practical test.
- You will need to pay special attention to several of the appendices.
    - Appendix 5 covers roles, responsibilities, and outcomes. Lots of the material will be familiar to you.
    - Appendix 6 consolidates safety of flight information, such as stall/spin awareness, use of checklists, and important multiengine considerations.
    - Appendix 7 outlines aircraft requirements such as multiengine and equipment requirements. It also requires the applicant to demonstrate automation management skills.
    - Appendix 8 provides significantly updated and enhanced information on use of flight simulation training devices and aviation training devices.

How do I use the ACS?

- **Learn how the ACS format works**
  - Areas of Operations
  - Tasks
  - Elements

I. Preflight Preparation

Task	*D. Cross-Country Flight Planning*
References	14 CFR part 91; FAA-H-8083-2, FAA-H-8083-25; Navigation Charts; A/FD; AIM; NOTAMs
Objective	To determine that the applicant exhibits satisfactory knowledge, skills and risk management associated with cross-country flights and VFR flight planning.
Knowledge	The applicant demonstrates understanding of:
PA.I.D.K1	1. Route planning, including consideration of special use airspace.
PA.I.D.K2	2. Applying universal coordinated time (UTC) to flight planning.
PA.I.D.K3	3. Converting and calculating time relative to time zones and ETA.
PA.I.D.K4	4. Calculating time, rate, course, distance, heading, TAS and ground speed, course.
PA.I.D.K5	5. Fuel planning.
PA.I.D.K6	6. Altitude selection accounting for terrain and obstacles, glide distance of aircraft, VFR cruising altitude, and effect of wind.

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- As you get acquainted with the ACS, you will see that it is divided into Areas of Operations, Tasks, and Elements, just like the PTS.
- There have been some changes to the Areas of Operation, Tasks, and Elements in the Private Pilot Airplane ACS.
- The Instrument ACS uses the same Areas of Operations as the PTS.
- When the ACS became effective, the IACRA tables were updated to match the ACS.

How do I use the ACS?

- **Learn how the ACS format works.**
  - A Task within an Area of Operation applies to all classes in the category – in this case, the airplane category – unless the Task title includes a limitation.

II. Preflight Procedures

Task	*D. Taxiing (ASEL, AMEL)*
References	FAA-H-8083-2, FAA-H-8083-3, FAA-H-8083-25 (Appendix 1); POH/AFM; AC 91-73,; A/FD; AIM
Objective	To determine that the applicant exhibits satisfactory knowledge, skills and risk management associated
Knowledge	The appli
PA.II.D.K1	1. Po

II. Preflight Procedures

Task	*E. Taxiing and Sailing (ASES, AMES)*
References	FAA-H-8083-2; FAA-H-8083-23, FAA-H-8083-25; POH/AFM; AC 91-73; A/FD, AIM.
Objective	To determine that the applicant exhibits satisfactory knowledge, skills and risk management associated with safe taxiing and sailing operations, including runway incursion avoidance.
Knowledge	The applicant demonstrates understanding of:
PA.II.E.K1	1. Positioning aircraft controls for wind, water and sailing procedures, including the use of

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- In the ACS, a Task within an Area of Operation applies to all classes in the category – in this case, the airplane category – unless the Task title includes a limitation.
- As the example shows, a seaplane applicant would not be tested on Task D. Taxiing. Instead, this applicant would be tested on Task E, Taxiing and Sailing.
- Otherwise, an evaluator must include each Task in the Plan of Action. It is acceptable to combine Tasks when it makes sense to do so, as long as each required element is evaluated.
- Required elements consist of all Skill elements, just like with the PTS, as well as one Knowledge element, one Risk management element, and any elements shown deficient on the Airman Knowledge Test Report.

How do I use the ACS?

- **Select required Areas of Operation.**
  - The Plan of Action must include all Areas of Operation and Tasks that apply to the category and class of the aircraft brought to the test.

X. Multiengine Operations

NOTE: If the applicant does not hold an instrument rating airplane, Tasks C and D do not need to be accomplished. All other Tasks need to be completed.

Task	*A. Maneuvering with One Engine Inoperative (AMEL, AMES)*
References	FAA-H-8083-2, FAA-H-8083-3, FAA-P-8740-19; POH/AFM
Objective	To determine that the applicant exhibits satisfactory knowledge, skills and risk management associated with one engine inoperative.

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- Just as with the PTS, the evaluator's written Plan of Action must include all Areas of Operation and Tasks appropriate to the category and class of the aircraft the applicant brings to the test.
- In this example, the entire Area of Operation is marked for Multiengine Operations, so none of these Tasks would be included on a practical test for airplane single-engine land.

How do I use the ACS?

- **Select required Tasks.**
  - Each Task within an Area of Operation is required, unless it doesn't apply to the aircraft category/class.

II. Preflight Procedures

Task	***D. Taxiing (ASEL, AMEL)***
References	FAA-H-8083-2, FAA-H-8083-3, FAA-H-8083-25 (Appendix 1); POH/AFM; AC 91-73,; A/FD; AIM
Objective	To determine that the applicant exhibits satisfactory knowledge, skills and risk management associated with safe ta
Knowledge	The applicant demon
PA.II.D.K1	1. Positioning air

II. Preflight Procedures

Task	***E. Taxiing and Sailing (ASES, AMES)***
References	FAA-H-8083-2; FAA-H-8083-23, FAA-H-8083-25; POH/AFM; AC 91-73; A/FD, AIM.
Objective	To determine that the applicant exhibits satisfactory knowledge, skills and risk management associated with safe taxiing and sailing operations, including runway incursion avoidance.
Knowledge	The applicant demonstrates understanding of:
PA.II.E.K1	1. Positioning aircraft controls for wind, water and sailing procedures, including the use of

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- In the ACS, a Task within an Area of Operation applies to all classes in the category – in this case, the airplane category – unless the Task title includes a limitation.
- As the example shows, a seaplane applicant would not be tested on Task D. Taxiing. Instead, this applicant would be tested on Task E, Taxiing and Sailing.
- Otherwise, the evaluator must include each Task in the Plan of Action. It is acceptable to combine Tasks when it makes sense to do so, as long as each required element is evaluated.

How do I use the ACS?

- **Review and select Task Elements**
  - As with the PTS, the Plan of Action should combine Tasks and Task Elements to create an efficient, scenario-based test.
  - *The ACS should not make either the oral portion or the flight portion of the practical test any longer than it is now.*

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- As with the PTS, the Plan of Action should combine Tasks and Task Elements to create an efficient, scenario-based test.
- The ACS should not make either the oral portion or the flight portion of the practical test any longer than it is now.

How do I use the ACS?

- **Review and select Task Elements**
  - Plan of Action must include:
    - *At least* one Knowledge Element
    - *At least* one Risk Management Element
    - *All* Skill Elements from required Tasks
    - All subjects missed on the knowledge test
      - You may use Task Elements from missed knowledge test subjects to meet the minimum requirement for one Knowledge and one Risk management element.
      - You have the discretion to select additional elements if the knowledge test report or the applicant's response to questions indicates weakness in a given Task.

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The evaluator's written Plan of Action must include:

•*At least* one Knowledge Element

•*At least* one Risk Management Element

•*All* Skill Elements from required Tasks

•All subjects missed on the knowledge test

- The evaluator may use Task Elements from missed knowledge test subjects to meet the minimum requirement for one Knowledge and one Risk management element.
- As is the case now, evaluators have the discretion to select additional elements if the knowledge test report or the applicant's response to questions indicates weakness in a given Task.

How do I use the ACS?

- **Review and select Task Elements**
  - If the Task includes sub-elements, you may select either the primary element or an appropriate sub-element (e.g., landing gear).

Task	*Task G. Operation of Systems*
References	FAA-H-8083-2, FAA-H-8083-23, FAA-H-8083-25; POH/AFM, AFH.
Objective	To determine that the applicant exhibits satisfactory knowledge, risk management, and skills associated with the safe operation of systems on the airplane provided for the flight test.
Knowledge	The applicant demonstrates understanding of:
PA.I.G.K1	1. Major components of the systems:
PA.I.G.K1a	a. Primary flight controls and trim
PA.I.G.K1b	b. Flaps, leading edge devices, and spoilers as appropriate
PA.I.G.K1c	c. Powerplant and propeller (basic engine knowledge)
PA.I.G.K1d	d. Landing gear
PA.I.G.K1e	e. Fuel, oil, and hydraulic
PA.I.G.K1f	f. Electrical

  - If you select the broader primary element, develop questions only from material covered in the references listed for the Task.

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- As this illustration shows, some ACS Tasks include sub-elements, which are coded with a lower-case alphabet letter.
- If the Task includes sub-elements, the evaluator may select either the primary element or an appropriate sub-element (e.g., landing gear).
- If the evaluator selects the broader primary element, questions should come only from material covered in the references listed for the Task.

How do I use the ACS?

- **Review and select Task Elements.**
  - Knowledge (K)
  - Risk Management (R)
  - Skill (S)

I. Preflight Preparation

Task	*D. Cross-Country Flight Planning*
References	14 CFR part 91; FAA-H-8083-2, FAA-H-8083-25; Navigation Charts; A/FD; AIM; NOTAMs
Objective	To determine that the applicant exhibits satisfactory knowledge, skills and risk management associated with cross-country flights and VFR flight planning.
Knowledge	The applicant demonstrates understanding of:
PA.I.D.K1	1. Route planning, including consideration of special use airspace.
	2. Applying universal coordinated time (UTC) to flight planning.

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- The ACS presents Task Elements in three categories: knowledge, risk management, and skill.
  - Knowledge (K) elements focus on things that the airman must know.
  - Risk management (R) elements focus on things the airman must consider to safely perform the Task. You will notice that the ACS incorporates the PTS “special emphasis” items in this section of the relevant Areas of Operation and Tasks.
  - Skill (S) elements are what the applicant must be able to do as part of the test. The ACS does not change any of the tolerances you already know from the PTS.
- Both the knowledge test and the practical test include knowledge, risk management, and skill elements. The integrated ACS approach provides both specificity and context.

How do I use the ACS?

There is no one-to-one correlation between LSC (PLT) codes and ACS codes. Still, you can use the ACS to narrow the scope to retrain and retest deficient areas in the context of relevant Area(s) of Operation and Task(s).

Examples:

PLT 040
Airspace classes, charts, diagrams

PLT 161
Aircraft Systems / Avionics / Transponder / Airspace / Publications / AFD / Transponder Operations

PLT 162
Airspace requirements, operations

PLT 163
Airspace requirements, visibility / cloud clearance

PLT 376
Airspace, special use, TFRs

PLT 393
Airspace, regulations / restrictions

PA.I.D.K1
Ask about airspace in context of planning a XC flight

PA.I.E.K1-6
Ask about airspace as part of preflight preparation

PA.II.A.S4
Ask about airspace as part of preflight assessment

PA.V.B.S1
Ask about airspace as part of ground reference maneuvers evaluation

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- Today's Learning Statement, or PLT, Codes are linked to references. So there is a large number of PLT codes.
- By contrast, each ACS code is tied to a unique Task Element in the standard itself.
- Because of this difference, there is no one-to-one correlation between the PLT codes and the ACS codes.
- As you heard on a previous slide, though, all active knowledge test questions for the private pilot airplane and the instrument-airplane rating knowledge tests have been aligned with the corresponding ACS.
- As this slide shows, that means that applicants, instructors, and evaluators can look up the PLT code(s) on the Airman Knowledge Test Report, and use the subject area to do two things:
    - Narrow the scope of material for retraining and retesting
    - Retrain and evaluate that material in the context of the appropriate Areas of Operation and Tasks.

How do I use the ACS?

Examples:

PLT003
Calculate aircraft performance – CG

PA.I.F.K4
The effects of exceeding weight and balance limits.

PA.I.F.K5
The effects of weight and balance changes over the course of the flight.

PA.I.J.K3
The effects of airplane weight and center of gravity (CG) on control.

PA.I.F.R3
Variations in flight performance resulting from weight and balance changes during flight.

PA.I.F.S1
Compute weight and balance for a given scenario, which includes practical techniques to resolve out-of-limit calculations and determine if the weight and balance will remain within limits during all phases of flight.

Federal Aviation Administration

- This slide and the next one show additional examples.

How do I use the ACS?

Examples:

PLT004	Calculate aircraft performance - climb / descent / maneuvering
PLT005	Calculate aircraft performance - density altitude
PLT006	Calculate aircraft performance - glide
PLT007	Calculate aircraft performance - IAS
PLT008	Calculate aircraft performance - landing

PA.I.F.K1
Elements related to performance and limitations (e.g. takeoff and landing, crosswind, tailwind and headwind, density altitude, glide performance, weight and balance, climb, cruise, descent, powerplant considerations) by explaining the use of charts, tables, and data to determine performance.

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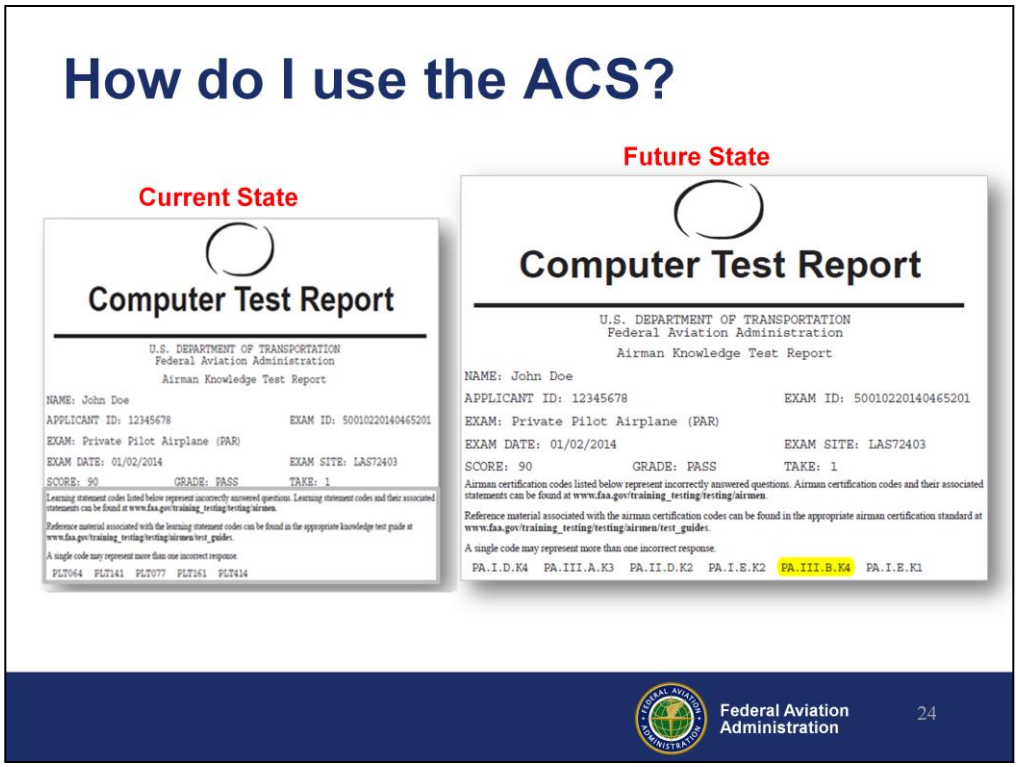
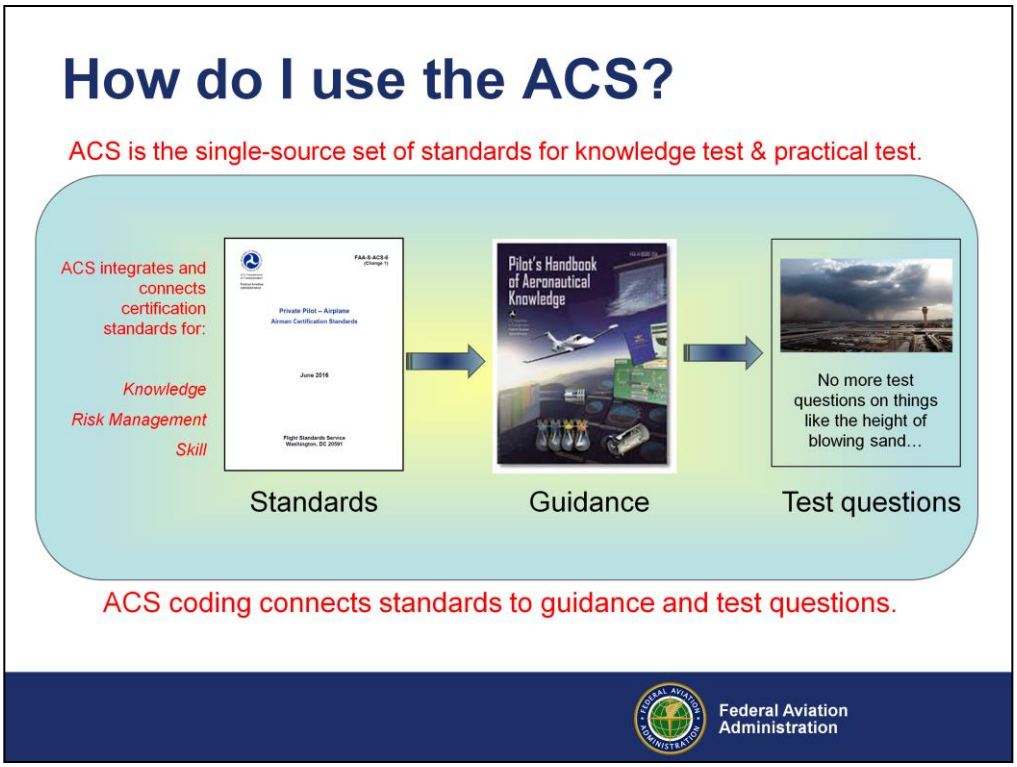


- As discussed earlier, the FAA is already using the ACS codes to ensure that the standards for knowledge, risk management, and skill are aligned with guidance material and test questions.
- That means that all active knowledge test questions for the private pilot airplane and the instrument-airplane rating knowledge tests have already been aligned with the corresponding ACS.
- The current knowledge test management system does not have the capability to print ACS codes. Until the FAA completes the acquisition of a new test management services contract, you will continue to see today's Learning Statement, or PLT, Codes on the Airman Knowledge Test Report.



- To summarize again:

- The ACS coding system provides the “thread” to link standards to guidance and test questions, and to keep them aligned in the future.
- Later on, this ACS code will replace the LSC, or PLT, code now shown on the Airman Knowledge Test Report.
- Already, though, the industry team has used the ACS coding to help ensure that handbooks are aligned with the standards as defined with the ACS. The FAA is incorporating industry recommendations for a number of these documents.
- The FAA has already used the ACS coding system to revise and align all private pilot airplane and instrument-airplane rating knowledge test questions to the knowledge, skill, and risk management elements in the corresponding ACS.

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How do I use the ACS?

Some private pilot airplane ACS Areas of Operation and Tasks have been renamed, reorganized, or combined:

PTS Sections 1 (Single-Engine) and 2 (Multi-Engine) Airplane	Combined into a single ACS document. •Tasks are identified with ASEL, ASES, AMEL, AMES so applicants know which tasks apply to the desired rating. •A task without these identifiers applies to all applicants.
PTS Special Emphasis Items	Incorporated into the relevant ACS Task(s).
PTS Task Certificates and Documents	ACS Task Pilot Qualification
PTS Task Aeromedical Factors	ACS Task Human Factors
PTS Task Water and Seaplane Characteristics PTS Task Seaplane Bases, Maritime Rules and Aids to Marine Navigation	Combined into a single ACS Task
PTS Task Preflight Inspection	ACS Task Preflight Assessment
PTS Task Runway Incursion Avoidance Task removed	Relevant task elements incorporated into the ACS Taxiing, Traffic Patterns, Takeoff, and Landing Tasks
PTS Task Airport/Seaplane Base, Runway, and Taxiway Signs, Markings and Lighting Task removed	Relevant task elements incorporated into ACS Taxiing Task
PTS Tasks for Normal/Crosswind takeoffs & landings renamed	ACS Normal Takeoffs & Landings Tasks
PTS Area of Operation Performance Maneuvers now includes two Tasks	ACS Performance Maneuvers Area of Operation has Steep Turns and Ground Reference Maneuvers Tasks. Ground Reference Maneuvers is no longer a standalone Area of Operation

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This slide and the next one show how certain parts of the private pilot airplane PTS are presented in the private pilot airplane ACS.

How do I use the ACS?

Some private pilot airplane ACS Areas of Operation and Tasks have been renamed, reorganized, or combined:

PTS Tasks Rectangular Course, S-Turns, Turns-Around a Point	Combined into a single Task called "Ground Reference Maneuvers." •The testing requirements have not changed. •Evaluators still select at least one of these Tasks for the applicant to demonstrate during the practical test
PTS Tasks Slow Flight and Stalls tolerance specifications	ACS discourages performing the maneuver with the stall horn activated. •This change is consistent with new FAA guidance for these maneuvers, which is incorporated into the forthcoming revision of the FAA's Airplane Flying Handbook
PTS Tasks Anchoring, Docking and Mooring, and Ramping/Beaching	Combined into a single ACS Task called Seaplane Post-Landing Procedures

Federal Aviation Administration

What's the Story on Slow Flight?

Maneuvering During Slow Flight in an Airplane

Change 3 (May 2, 2012)

VIII. Slow Flight and Stalls

(Note removed)

Task A: Maneuvering During Slow Flight (ASEL and ASES)

References: FAA-H-8083-3; POH/AFM

Objective: To determine that the applicant:

1. Exhibits satisfactory knowledge of the elements related to maneuvering during slow flight.
2. Selects an entry altitude that will allow the task to be completed no lower than 1,500 feet AGL.
3. Establishes and maintains an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in an immediate stall.
4. Accomplishes coordinated straight-and-level flight, turns, climbs, and descents with landing gear and flap configurations specified by the examiner.
5. Divides attention between airplane control and orientation.
6. Maintains the specified altitude, ±100 feet; specified heading, ±10°; airspeed, +10/–0 knots; and specified angle of bank, ±10°.

VII. Slow Flight and Stalls

Task	***Task A. Maneuvering During Slow Flight***
References	FAA-H-8083-2, FAA-H-8083-3; POH/AFM
Objective	To determine that the applicant exhibits satisfactory knowledge, risk management, and skills associated with maneuvering during slow flight.
Knowledge	The applicant demonstrates understanding of:
PA.VII.A.K1	1. This maneuver as it applies to different phases of flight.
PA.VII.A.K2	2. The relationship between angle of attack (AOA), airspeed, load factor, aircraft configuration, aircraft weight, and aircraft attitude.
PA.VII.A.K3	3. The range and limitations of stall warning indicators (e.g.: aircraft buffet, stall horn, etc.).
PA.VII.A.K4	4. The difference between AOA and aircraft attitude during all flight conditions and how it relates to aircraft performance.
PA.VII.A.K5	5. How environmental elements affect aircraft performance.
PA.VII.A.K6	6. The importance of the 1,500-foot AGL (ASEL/ASES) or 3,000-foot AGL (AMEL/AMES) minimum altitude.
Risk Management	The applicant demonstrates the ability to identify, assess and mitigate risks, encompassing:
PA.VII.A.R1	1. The interplay of aerodynamic factors (angle of attack (AOA), airspeed, load factor, aircraft configuration, aircraft weight, and aircraft attitude).
PA.VII.A.R2	2. Range and limitations of stall warning indicators (e.g.: aircraft buffet, stall horn etc.).
PA.VII.A.R3	3. The effect of environmental elements on aircraft performance.
PA.VII.A.R4	4. Collision avoidance, scanning, obstacle and wire strike avoidance.
PA.VII.A.R5	5. Failure to react appropriately to a stall warning.
PA.VII.A.R6	6. Failure to maintain coordinated flight during the maneuver.
PA.VII.A.R7	7. Failure to manage pitch attitude and power to avoid a stall warning or a stall.
Skills	The applicant demonstrates the ability to:
PA.VII.A.S1	1. Select an entry altitude that will allow the Task to be completed no lower than 1,500 feet AGL (ASEL, ASES) or 3,000 feet AGL (AMEL, AMES).
PA.VII.A.S2	2. Establish and maintain an airspeed, approximately 5-10 knots above the 1G stall speed, at which the airplane is capable of maintaining controlled flight without activating a stall warning.
PA.VII.A.S3	3. Accomplish coordinated straight-and-level flight, turns, climbs, and descents with landing gear and flap configurations specified by the evaluator without activating a stall warning.
PA.VII.A.S4	4. Divide attention between airplane control, traffic avoidance and orientation.
PA.VII.A.S5	5. Maintain the specified altitude, ±100 feet; specified heading, ±10°; airspeed +10/-0 knots; and specified angle of bank, ±10° or as recommended by aircraft manufacturer to a safe maneuvering attitude.

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The confusion (and therefore controversy) over this change arises from the fact that the distinction between the pre-PTS task of flight at minimum controllable airspeed (V_{mca}) and the intent of the slow flight task in the retired PTS and the now in the ACS slow flight task has been lost. The purpose of the slow flight task is to evaluate maneuvering the aircraft in the configurations and airspeeds used in different regimes of flight up to the "approach to stall regime."

The stall regime of flight should be thoroughly trained and tested from the "approach to stall" through full aerodynamic stalls. Certainly, any time there is intentional disregard for the stall warning system, it should be verbally acknowledged. However, when students (particularly sport and private pilots) are taught to ignore the stall warning system in the accomplishment of a task, there is a high probability that they will "habituate" and therefore not perceive, process, or perform the stall recovery procedure when necessary.

The law of primacy takes effect here as well, and it is difficult to reintroduce the importance of a stall warning system after immersive training requiring the applicant to keep it activated just to pass the practical test. Alert fatigue is another process in play when training activities interfere with what is needed from the aviator in the real world.

What's the Story on Slow Flight?

Maneuvering During Slow Flight in an Airplane

Slow Flight – (as presented in the forthcoming revision to the FAA *Airplane Flying Handbook*)

Slow flight is when the airplane AOA is just under the AOA which will cause an aerodynamic buffet or a warning from a stall warning device if equipped with one. Slow flight is performed with the power and airspeed just sufficient to maintain level flight. A small increase in AOA may result in an impending stall, which increases the risk of an actual stall.

In most normal flight operations the airplane would not be flown close to the stall-warning AOA, but because the airplane is flown at higher AOAs, and thus reduced speeds in the takeoff/departure and approach/landing phases of flight, learning to fly at reduced airspeeds is essential. In these phases of flight, the airplane's close proximity to the ground would make loss of control catastrophic; therefore, the pilot must be proficient in slow flight.

The objective of maneuvering in slow flight is to understand the flight characteristics and how the airplane's flight controls feel near its aerodynamic buffet or stall-warning. It also helps to develop the pilot's recognition of how the airplane feels, sounds, and looks when a stall is imminent. These characteristics include, degraded response to control inputs and difficulty maintaining altitude. Practicing slow flight will help pilots recognize an impending stall not only from the feel of the controls, but also from visual cues, aural indications, and instrument indications.

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Forthcoming guidance material

What's the Story on Slow Flight?

Maneuvering During Slow Flight in an Airplane

Slow Flight – (as presented in the forthcoming revision to the FAA *Airplane Flying Handbook*)

For pilot training and testing purposes, slow flight includes two main elements:

1. Slowing to, maneuvering at, and recovering from an airspeed at which the airplane is still capable of maintaining controlled flight without activating the stall warning—5 to 10 knots above the 1G stall speed is a good target; and

2. Performing slow flight in configurations appropriate to takeoffs, climbs, descents, approaches to landing, and go-arounds.

Slow flight should be introduced with the airspeed sufficiently above the stall to permit safe maneuvering, but close enough to the stall warning for the pilot to experience the characteristics of flight at a very low airspeed.

When practicing slow flight, a pilot learns to divide attention between aircraft control and other demands.

How the airplane feels at the slower airspeeds aids the pilot in learning that as airspeed decreases, control effectiveness decreases.

Federal Aviation Administration

Forthcoming guidance material

What's the Story on Slow Flight?

Maneuvering During Slow Flight in an Airplane

Safety Alert for Operators (SAFO) 16010:

•The purpose of performing the slow flight maneuver has not changed from the Private Pilot Airplane Practical Test Standards (PTS), FAA-S-8081-14B.

•One objective of the slow flight maneuver is to understand the flight characteristics and how the airplane feels with less airflow over the flight control surfaces while in the region of reverse command (i.e., back side of the power curve) near its aerodynamic buffet or stall warning. These flight characteristics include the degraded response to control inputs, the difficulty of maintaining altitude, the need for larger power inputs to accelerate compared to normal flight, and the associated instrument indications. Additional sensory perceptions include seeing less or no horizon as a result of the higher pitch attitude and the reduced ambient sound.

•These slow flight characteristics can be experienced, and therefore the learning objective achieved, in climbs, turns, descents, and straight and level flight without intentionally flying the airplane with the stall warning activated.

•***The FAA does not advocate disregarding a stall warning while maneuvering an airplane. With the exception of performing a thoroughly briefed full stall maneuver, a pilot should always perform the stall recovery procedure when a stall warning is activated.***

https://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo/all_safos/media/2016/SAFO16010.pdf

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SAFO provides a "bridge" between ACS and publication of Airplane Flying Handbook

What's the Story on Slow Flight?

Maneuvering During Slow Flight in an Airplane

Safety Alert for Operators (SAFO) 16010:

•While not specifically performed or evaluated as part of the slow flight maneuver, the FAA still expects a pilot to know and understand the aerodynamics behind how the airplane performs from the time the stall warning is activated to reaching a full stall.

•This can be learned in ground training and further consolidated in the airplane while practicing the Stall Task skills in the ACS.

•The training should build off of what was learned from the slow flight maneuver and highlight the continued degradation of the flight control response, the more pronounced left-turning tendencies in reciprocated-engine airplanes, and the importance of maintaining coordinated flight.

•This all contributes to a better understanding of slow flight aerodynamics, stalls, and the necessary actions to recover from a stall, which can ultimately prevent a loss of control in flight.

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SAFO provides a "bridge" between ACS and publication of Airplane Flying Handbook

What's the Story on Slow Flight?

Maneuvering During Slow Flight in an Airplane

*Continuum of reducing aircraft speed and energy state of the aircraft:

Normal flight operations:
Slow flight - as now represented as the regime from more than 10 knots above stall to 5 knots above stall. Under the ACS, this is trained for and tested to this standard: Stall +5 to +10 knots above stall indication. We are teaching the student to operate at the bottom on the normal flight regime and testing that exact skill. It also develops the notion that the stall warning device indicates an abnormal situation that needs to be addressed.

Abnormal flight operations:
Flight in the regime from 5 knots above the stall indication (be it actual or artificial indication). This is part of the training for the performance of full stalls. It should be, and is allowed to be, part of the training for a planned and fully briefed execution of a full stall. An instructor can train in this regime as much as required for student proficiency. It is trained, but not specifically tested under the ACS.

Emergency flight operations:
Full stall and recovery. This is training includes training from slowing/loading to the break in the stall through the full recovery. The testing standard for stall recovery is an appropriate separate standard from the slow flight standard.

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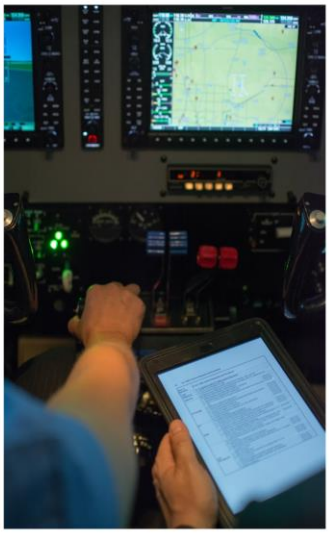
This slide provides a framework for understanding how these elements relate to each other, and to real-world flight operations.

What's Next for the ACS?

In development through Dec 2017:

- Commercial (Airplane)
- Airline Transport Pilot (Airplane)
- Instructor (Airplane)
- Aircraft Mechanic Certificate with Airframe and/or Powerplant ratings

FAA & ACS Working Group will jointly determine priority for development of ACS in additional categories/classes and certificates/ratings.



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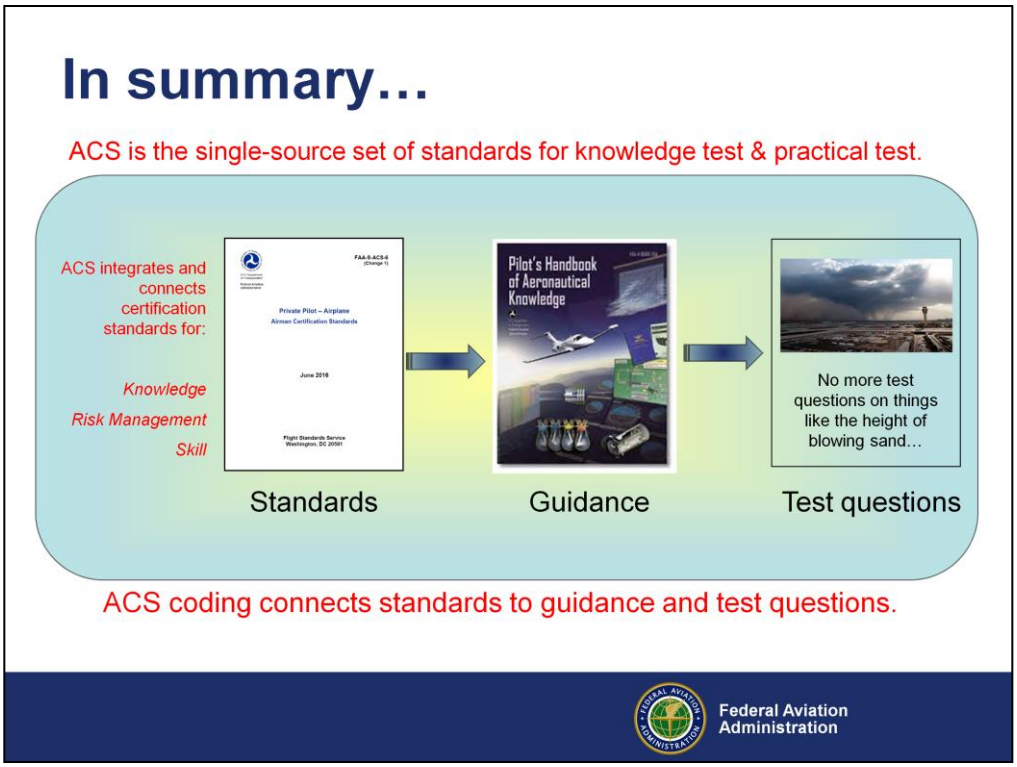

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Resources

- **Airman Testing Web Page**
  - http://www.faa.gov/training_testing/testing/
  - http://www.faa.gov/training_testing/testing/acs/
- **FAASafety.gov – ALC-449**
  - www.faasafety.gov
- **ACS Focus Team**
  - 9-AVS-ACS-Focus-Team@FAA.gov
- **Safety Alert for Operators - 16010**
  - https://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo/all_safos/

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- The ACS team has developed a number of resources to help you get acquainted with the ACS. This slide shows links to the key areas.
- The Airman Testing web page includes:
  - The ACS for Private Pilot Airplane (PAR) certificate and Instrument-Airplane Rating (IRA)
  - ACS Frequently Asked Questions
  - An ACS Informational Brochure
  - An ACS PowerPoint presentation with notes
  - Sample PAR and IRA knowledge tests that show both PLT and ACS codes
  - A What's New in Airman Testing document that includes a list of subjects deleted from airman knowledge tests.
- The FAASafety.gov site now includes a WINGS credit course called "Understanding the ACS."
- The FAA established the ACS Focus Team as the one-stop-shop for answering any questions not addressed on the Airman Testing web page. Please don't hesitate to contact the ACS Focus Team if you need help.
- Thanks for your attention, and we look forward to hearing your feedback on the Airman Certification Standards.