★★ First Revision ★★

Flight Instructor's Lesson Plan Handbook

Course Syllabus and Flight Training Procedures for

Private • Commercial • Instrument

Airplane Single-Engine Land Pilot Certificates/Rating

Based On The

FAA Practical Test Standards

by **Edwin Quinlan**

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Aviators *Publishing*
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Edition

by Edwin Quinlan

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Ed Quinlan

ABOUT THE AUTHOR

Edwin Quinlan has over three decades of flight experience in flying a multitude of aircraft, from a J-3 Cub to a DC-3, and from Gliders to Lear Jets. He holds an airline transport certificate for both single and multi-engine. He is a commercial rated glider pilot, and has a commercial sea plane rating for both single and multi-engine airplanes. He is an FAA Gold Seal Certificated Flight Instructor, airplane single and multi-engine, and instrument, and is an FAA Aviation Safety Counselor at Chicago Du Page FSDO. At speaking engagements throughout the U.S., he provides entertaining and persuasive programs on effective teaching techniques and methods for flight instructors. For several years he served as a staff ground instructor and has taught Private, Commercial, and Instrument written test preparation courses for the FAA written examination, at College of DuPage, in Illinois. He is an active member of the University Aviation Association (UAA), Experimental Aircraft Association (EAA), and the Aircraft Owners and Pilots Association (AOPA). Additionally he is the author of: Flight Instructor's Teaching Techniques For Airplane Maneuvers and Procedures, Recreational Airplane Pilot Flight Training Lesson Plan Handbook, and editor of Instructors' Manual – Basic Combat Flying. As a flight instructor he has taught numerous pilot applicants how to fly with great success using his published techniques, and the lesson plans in this book.

D e d i c a t e d

To

Carolyn Lea Baldwin

my wife
and best friend
for the past
thirty years;
without her
enthusiastic support,
and, encouragement
this book
would not have
been possible;
and
to all that
dream of
learning to
fly

A bird is an instrument functioning according to mathematical laws, which instrument is within the capacity of man to reproduce with all its movements.

Leonardo da Vinci

The secret of education lies in respecting the pupil.

Ralph Waldo Emerson

The most important method of education always has consisted of that in which the pupil was urged to actual performance.

Albert Einstein

If a man empties his purse into his head, no man can take it away from him. An investment in knowledge always pays the best interest.

Benjamin Franklin

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PREFACE

The Flight Instructor - Airplane Practical Test Standards, published by the Federal Aviation Administration require a flight instructor applicant to exhibit instructional knowledge of the elements related to the planning of instructional activity by describing:

1. Development of a course of training.
2. Content and use of a training syllabus.
3. Purpose, characteristics, proper use, and items of a lesson plan.
4. Flexibility features of a course of training, syllabus, and lesson plan required to ***accommodate students with varying backgrounds, levels of experience, and ability.***

DESIGNEE UPDATE, a quarterly FAA publication designed to serve the Examiner, Designee, and Instructor Community, recently published the following clarification to the above:

Flight Instructor's PTS

> There seems to be some question as to the intent of Area of Operation IV Task: Preflight Lesson on a Maneuver to be Performed in Flight, found in all of the flight instructor Practical Test Standards.
>
> The intent of the TASK, Maneuver Lesson, is for the flight instructor applicant to prepare a written lesson plan and teach a ground school lesson to a pilot examiner, prior to going out to the aircraft for a flight test. **It is acceptable for the applicant to use a lesson plan that has been prepared in advance. In addition, this lesson plan should follow the format shown in the basic reference to this TASK, AC 60-14, Aviation Instructor's Handbook.** The ground school lesson is to be conducted using a TASK selected by the examiner from any of the TASKS listed in the NOTE for this area of operation. (Emphasis added).

The lesson plans in this handbook follow the format revealed and prescribed in AC 60-14, Aviation Instructor's Handbook. All have been developed to increase the awareness and guidance of flight instructor applicants preparing to qualify for the flight instructor certificate, and for use as a reference by certificated flight instructors to assist in developing the necessary expertise in accurately preparing flight training syllabuses and lesson plans for the required flight training prescribed in Title 14 of the Code of Federal Regulations (14 CFR), Part 61, and Part 141, together with the appropriate Practical Test Standards (PTS).

Learning to fly should be interesting. Knowing the objective of each period of instruction gives meaning and interest to the instructor's and pilot applicant's efforts. ***Not knowing the objective involved leads to confusion, disinterest, and uneasiness on the part of the pilot applicant.*** The flight instructor should advise the pilot applicant of the availability of the companion manuals, Private Pilot Flight Training Lesson Plans, Commercial Pilot Flight Training Lesson Plans, and Instrument Rating (Airplane) Flight Training Lesson Plans. It has been demonstrated that when the flight instructor and pilot applicant both utilize the same lesson plan(s), that more effective training results in less time.

Comments regarding this handbook may be directed to Aviators Publishing, 19 W 074 Ave. Barbizon, Oak Brook, IL - 60521-1003

Amended March 2000

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Dean Austin, of Houston, Texas – a commercial, single and multi-engine, instrument rated pilot, who agreed to be a "test pilot" utilizing the lesson plans in his current instructor flight training program. His comments, ideas and enthusiastic support are greatly appreciated. Because of his comments regarding the common errors and reference sections, both sections were expanded.

P. Evans Boeve, of Athens, Ohio – an Aviation student at Ohio University, enrolled in a CFI Program, was in the unique position of preparing for his FAA Airplane Flight Instructor's Practical Test, which he subsequently passed. He was kind enough to review, analyze, and compare the lesson plans in this manual with the material he was currently using to develop his own syllabuses and lesson planning skills. Evans wrote an extensive and detailed review of the lesson plans, which proved to be quite beneficial and enlightening. Additionally he stated the following, **"CFI applicants who incorporate your book into their training will walk into the practical test with boosted confidence and a feeling of preparedness."** I thank Evans for his time, ideas, and encouraging remarks.

Bradley W. Deines, of Prescott, Arizona – an airline transport pilot, multi-engine, and instrument airplane certificated flight instructor, who has a wealth of current flight training management experience. He is presently flight training manager/assistant chief flight instructor at Embry-Riddle Aeronautical University, Prescott, Arizona. Additionally, he is the author and publisher of two commercially-marketed instructional manuals, (see bibliography). It is rare that one is fortunate enough to have the benefit of counsel from someone of Brad's noteworthy experience. I sincerely want to thank him for taking the time to review all the instrument flight lesson plans, and offer his suggestions and comments, and more importantly, his words of encouragement.

E. Allan Englehardt, of Lake Bluff, Illinois – is an Airline Pilot with type ratings in the B-757, B-767, and the B-747 400. An FAA Designated Pilot Examiner, he is also a former recipient of the FAA's **"Flight Instructor of the Year - National Award."** He continuously donates countless hours of his time conducting FAA Wings - Pilot Proficiency Programs, and works unfalteringly to foster and promote accurate Flight Instructor implementation of the PTS (Practical Test Standards). Mr. Englehardt, working in concert with the FAA has been instrumental in developing standardization of the FAA Practical Test (Flight Test Procedures). He was of significant help in clarifying various PTS tasks, and suggesting "task elements" that should be emphasized by the Flight Instructor to enhance the pilot applicants' flight test performance.

Howard J. Fried, of Holly, Michigan – a longtime FAA Designated Pilot Examiner who has administered over 4000 "Flight Tests". As a column editor for FLYING magazine, he has published hundreds of articles and published books about Flight Instructors and test applicants, (see bibliography). During his career, he has logged an impressive 40,000 hours in many types of military and general aviation aircraft. Howard has a clear understanding of the necessary flight training and reference material that a Flight Instructor applicant "must have and use" to ensure their successful completion of the rigid oral examination and rigorous practical test (flight test). He claims, that if a Flight Instructor is to train and develop a safe and competent pilot, the perpetual use of a detailed flight training "Lesson Plan" is essential. I asked Mr. Fried to review both the first and final drafts of the manuscript. He graciously agreed and offered substantive suggestions and comments which not only improved the lesson plans, but in fact, have caused the lesson plans to be widely accepted by colleges and universities that have flight training curriculums, as the number one Flight Instructor's Flight Training Lesson Plan Reference Checklist.

Leslie A. Gilbeau, of Hobart, Indiana – has spent many hours laboriously analyzing, reviewing and correcting the original drafts. His endless assistance has contributed substantially to this lesson plan handbook. Les is an exceptionally knowledgeable, articulate, and patient flight instructor with over twenty years of flying experience, and fourteen years of flight instruction. He has contributed a great deal to the general aviation community. He is a commercial single and multi-engine, instrument rated pilot, who received his private pilot certificate in 1977, and his instructor certificate in 1983.

Brian M. Jacobson, of White Lake, Michigan – is an aviation writer and author of "a book about instrument flying", (see bibliography) who took the time to review all of the instrument rating lesson plans, and make suggestions and comments that proved to be very helpful.

William K. Kershner, of Sewanee, Tennessee – is an aviation writer and author of several of the best flight training manuals ever published (see bibliography). He has been flying for more than 48 years, has taught over 400 students aerobatics, and received the **1992 National Instructor of the Year Award.** Yet this man was gracious enough to take the time to review the lesson plans, and offer some excellent recommendations. Then this accomplished author, writer, and aviator extraordinaire paid me the highest compliment that one can receive, **"You have done an excellent job – you've covered the territory very well."** In addition to the compliment, I must thank him for all the knowledge and joy I have received from his numerous flight training manuals.

Rod I. Machado, of San Clemente, California – was the **1991 Western Region Flight Instructor of the Year,** and now is a master flight instructor and aviation author with an unusual talent for simplifying the difficult, which he demonstrated in his Private Pilot Handbook, with its brilliant graphic presentation, and his dynamic narration of complex, technically oriented subjects (see bibliography). I truly want to thank him for taking the time to review the lesson plans and offering his candid counsel and valuable insights regarding the need for instructors to use lesson plans as a tool to ensure inclusion of all subject tasks and elements. For a comprehensive explanation of the required material Flight Instructors are urged to use Rod's manual as an additional study reference when reading assignments are dictated by the Flight Training Lesson Plans.

Kurt E. McKean, of Ontario, California – made an unquestionable contribution by agreeing to be the first instructor applicant to use the "Flight Instructor Lesson Plan Handbook" for his certification as a flight instructor and instrument flight instructor rating. After comparing this lesson plan handbook with the others available, he selected this manual to be used for his presentation to the FAA inspector because, "the other lesson plans available required an additional instruction manual just to figure them out, and still others incorporated little, if anything, regarding the FAA's Practical Test Standards." As a result, **the Los Angeles FSDO inspector advised, "I have never seen such a well put together CFI lesson plan notebook."** It is only with acceptance and encouragement like this that one can remain committed to a project such as this, and I am indebted to many.

David B. Loveland, of Traverse City, Michigan – who has over 42 years of flying experience, twenty in the United States Air Force and twenty-two years at Northwestern Michigan College, as chief flight instructor. He interrupted his busy schedule to evaluate the individual lesson plans and offered appropriate tutorial comments. His enthusiasm and expressed support for this project is gratifying, **"Congratulations.....A splendid effort and a very effective teaching tool for both the student and the instructor."** I am most appreciative for his phrases of encouragement and valuable suggestions.

Sandra Provenzano, of Houston, Texas – is an FAA Designated Pilot Examiner with a very impressive record as an aviation training leader. Not only has she given over 8,000 hours of flight instruction – she has administered over 1,500 pilot flight tests in the past 15 years. In addition to operating Aviation Training Consultants, Inc., specializing in pilot training and testing, Sandra serves as a lead instructor for Aviation Seminars, Inc., in their CFI Refresher Clinics, as well as the Private/Commercial and Instrument Seminars. She also works with Airline Ground Schools in the presentation of their Flight Engineer and Airline Transport Pilot Classes. Sandra was chosen FAA Accident Prevention Counselor of the year in 1984, received the **1990 Flight Instructor of the Year – National Award,** and was recently awarded a 'Presidential Citation' by AOPA President, Phil Boyer, for her many contributions to aviation safety and education. Even with her busy schedule, Sandra took the time to review all of the Commercial Lesson Plans, and made some very helpful suggestions, for which I am most grateful.

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To all of the above, again, I sincerely thank you.

Ed Quinlan

INTRODUCTION

PLANNING INSTRUCTIONAL ACTIVITY

Any instructional activity must be competently planned and organized if it is to proceed in an effective manner. Much of the basic planning necessary for the flight instructor is provided by the knowledge and proficiency requirements of Title 14 of the Code of Federal Regulations (CFR), and the Practical Test Standards (PTS), and the various texts, manuals, and training courses available. This introduction reviews briefly the planning required of the professional flight instructor as it relates to three topics:

1. **course of training,**
2. **training syllabus, and**
3. **lesson plan(s).**

COURSE OF TRAINING

Determination of Standards and Objectives

Before any important instruction can begin, a determination of standards and objectives is necessary. In the case of a pilot applicant training course, the overall objective is obvious, and the minimum standards are provided by Title 14 of the Code of Federal Regulations (CFR), and the FAA Practical Test Standards (PTS).

The general overall objective of any pilot applicant training course is to qualify the pilot applicant to be a competent, efficient, safe pilot for the operation of specific aircraft types under stated conditions. The criteria by which we determine whether the training has been adequate are the passing of written and flight tests required by Title 14 of the Code of Federal Regulations (CFR), and Practical Test Standards (PTS) for the issuance of pilot certificates.

Conscientious instructors, however, do not limit their objectives to meeting the minimum published requirements for a pilot certificate. They establish as their objectives the training of each pilot applicant to have the knowledge necessary to service an airplane properly, to maneuver and operate it accurately within its limitations, and to analyze and make prompt decisions with respect to its safe operation. This is only a partial list of general objectives, but is illustrative of the major planning which is the basis of any training endeavor.

Identification of Blocks of Learning

It is not practicable for instructors to proceed immediately toward the overall objectives they have established for a major training activity being undertaken. Training for any such complicated and involved skill as piloting an aircraft requires the development and assembly, in their proper relationships, of many segments or **"blocks of learning."** In this way, a pilot applicant can master the segments of the overall pilot performance requirements individually and can progressively combine these with other related segments until their sum meets the final objective.

Considered from this standpoint, training is much like building a pyramid—each block of learning is an identity in itself, but the pyramid is incomplete if any one block is missing. **The instructor "and" the pilot applicant must "both" recognize the interrelationship of the blocks and the place of each in the total objective.**

After the overall training objectives have been established, the next step is the identification of the blocks of learning which constitute the necessary parts of the total objective. Just as in building a pyramid, some blocks are submerged in the structure and never appear on the surface, but each is an integral necessary part of the structure. While identifying the blocks of learning to be assembled during the proposed training activity, the planner must examine each carefully to see that it is truly an integral part of the structure. **Extraneous blocks of instruction are expensive frills,** especially in flight instruction, and detract from, rather than assist in, the completion of the final objective.

The blocks of learning identified during the planning of a training activity should be progressively smaller in scope. They should represent **units of learning which can be measured and evaluated**—not a sequence of periods of instruction. For example, the flight training of a private pilot applicant might be divided into the following major blocks: achievement of the skills necessary for solo flight, the skills necessary for solo cross-country flight, and the skills appropriate

for application for a private pilot certificate. Each of these, in turn, should be broken into component blocks of learning.

The skills necessary for the first solo flight might be broken down as inflight maneuvering; airspeed control, including flight at minimum controllable airspeed, stalls, and descents at approach speed; maneuvering by ground references; normal and crosswind takeoffs and landings; maximum performance operations; etc. Each of these, in turn, must be subdivided to produce effective lesson plans for each period of instruction.

As seen from the illustration cited, the possibility for breaking down and categorizing training objectives is infinite. For practical planning, the **test for a useful size of a minimum block of learning** is whether it contains sufficient learning to:

1. provide a challenge for the pilot applicant,
2. promise a reasonable return in accomplishment for the training effort necessary, and
3. provide measurable objectives.

As these blocks of learning are completed and the pilot applicant's performance of each are confirmed to be at an acceptable level, the related blocks will be combined to form larger segments of the total training objective. For example, acceptable performance of airspeed management, maneuvering, and radio communications may be combined to provide the capability of flying a traffic pattern at an airport with a control tower. In this manner, **the use of a properly structured flight training lesson plan makes it possible for the instructor to direct each period of instruction toward the completion of blocks of learning**, which are in turn combined with others to lead toward the overall objective.

TRAINING SYLLABUS

The form of the syllabus may vary, but it is always in the form of an abstract or digest of the training course. It consists of the main blocks of learning to be completed in the most efficient order, (see Chart 1, on page XX).

The instructor may develop a training syllabus; however, there are available many tried and proven syllabuses which may be used. These are found in various training manuals, approved school syllabuses, and in publications available from industry.

Each approved training course conducted by a certificated pilot applicant school is given in strict accordance with a training syllabus specifically approved by the Federal Aviation Administration. Compliance with the appropriate approved syllabus is a condition for graduation from such courses. A pilot applicant who has not been trained in accordance with the pertinent syllabus is not eligible for certification as an approved school graduate.

Any practical training syllabus must be flexible, and should be used primarily as a guide. The order of training can and should be altered, when necessary, to suit the progress of the pilot applicant and the demands of special circumstances. In departing from the order prescribed by the syllabus, however, it is the responsibility of the instructor to consider the relationships of the blocks of learning affected. It is often preferable to skip to a completely different part of the syllabus when the conduct of a scheduled lesson is impossible, rather than proceeding to the next block, which may be predicated completely on skills to be developed during the lesson which is being postponed.

LESSON PLAN

A lesson plan is an organized outline or "blueprint" for a single instructional period and should be prepared in written form for each ground or flight instruction period, regardless of the instructor's experience. A lesson plan should be developed to show specific knowledge and/or skills to be taught. It is a necessary guide for the instructor in that it tells what to do, in what order to do it, and what procedure to use in teaching the material of the lesson.

A so-called "mental outline" of a lesson is not a lesson plan. **A lesson plan must be put into writing.** Another instructor should be able to take the lesson plan and know what to do in conducting the same period of instruction. When placed in writing, the lesson plan can be analyzed from the standpoint of safety, adequacy, completeness, and cost effectiveness.

Purpose of the Lesson Plan

Lesson plans are designed to assure that each pilot applicant receives the best possible instruction under the existing conditions. Lesson plans help instructors keep a constant check on their own activity, as well as that of their pilot applicants. The development of lesson

plans by instructors signifies, in effect, that they have taught the lessons to themselves prior to attempting to teach the lessons to the pilot applicant. **An adequate lesson plan, when properly used, should:**

1. **Assure a wise selection of material and the elimination of unimportant details.**

2. **Make certain that due consideration is given to each part of the lesson.**

3. **Aid the instructor in presenting the material in a suitable sequence for efficient learning.**

4. **Provide an outline of the teaching procedure to be used.**

5. **Serve as a means of relating the lesson to the objectives of the course of training.**

6. **Give the inexperienced instructor confidence.**

7. **Promote uniformity of instruction regardless of the instructor or the date on which the lesson is given.**

Characteristics Of A Well–Planned Lesson

1. **Unity.** Each lesson should be a unified segment of instruction. A lesson is concerned with certain limited objectives which are stated in terms of desired pilot applicant learning outcomes. All teaching procedures and materials should be selected to attain these objectives.

2. **Content.** Each lesson should contain new material. However, the new facts, principles, procedures, or skills should be related to the lesson previously presented. A short review of earlier lessons is usually necessary, particularly in flight training.

3. **Scope.** Each lesson should be reasonable in scope. A person can master only a few principles or skills at a time, the number depending on complexity. Presenting too much material in a lesson results in confusion; presenting too little material results in inefficiency.

4. **Practicality.** Each lesson should be planned in terms of the conditions under which the training is to be conducted. Lesson plans conducted in an airplane or ground trainer will differ from those conducted in a classroom. Also, the kinds and quantities of instructional aids available have a great influence on lesson planning and instructional procedures.

5. **Relation to Course of Training.** Each lesson should be planned and taught so that its relation to the course objectives are clear to each pilot applicant. For example, a lesson on short field takeoffs and landings should be related to both the certification and safety objectives of the course of training.

6. **Instructional Steps.** Every lesson, when adequately developed, falls logically into the four steps of the teaching process: i.e., preparation, presentation, application, and review and evaluation.

How to Use a Lesson Plan Properly

1. **Be Familiar With the Lesson Plan.** The instructor should study each step of the plan and should be thoroughly familiar with as much information related to the subject as possible.

2. **Use the Lesson Plan as a Guide.** The lesson plan is an outline for conducting an instructional period. It assures that pertinent materials are at hand and that the presentation is accomplished with order and unity. Having a plan prevents the instructor from "getting off the track," omitting essential points, and introducing irrelevant material. Pilot applicants have a right to expect an instructor to give the same attention to teaching that they give to learning. The most certain means of achieving teaching success is to have a carefully thought-out lesson plan.

3. **The Lesson Plan is not a Substitute for Thinking.** Instructors should always know more than they have time to teach. The lesson plan is a framework or skeleton; the instructor should fill it out with as many relevant examples and practical applications as possible.

4. **Adapt the Lesson Plan to the Class or Pilot Applicant.** In teaching a ground school period, the instructor may find that the procedures outlined in the lesson plan are not leading to the desired results. In this situation, the instructor should change the approach. There is no certain way of predicting the reactions of different groups of pilot applicants. An approach which has been successful with one group may not be

equally successful with another.

A lesson plan for a flight instruction period should be appropriate to the background, flight experience, and ability of the particular pilot applicant. A rigidly prepared lesson plan should not be used for an instructional flight because each pilot applicant requires a slightly different approach. A lesson plan may have to be modified considerably during flight, due to deficiencies in the pilot applicant's knowledge or poor mastery of elements essential to the effective completion of the lesson. In some cases, the entire lesson plan may have to be abandoned in favor of review.

5. **Revise the Lesson Plan Periodically.** After a lesson plan has been prepared for a ground school or flight period, a continuous revision will be necessary. This is true for a number of reasons: e.g., availability or nonavailability of instructional aids; changes in regulations, new manuals and textbooks; changes in the state-of-the-art, etc.

Lesson Plan Items

Any lesson plan, whether it is for a ground or flight instructional period, should contain the following items:

1. **Schedule.** The instructor should estimate the amount of time to be spent on a particular ground instruction lesson, and also the approximate time to be devoted to the presentation of the elements of that lesson. For example, the time to be devoted to a ground instruction lesson on "maneuvering by reference to flight instruments" could be 90 minutes, with approximately the following time periods being used to present each of the elements":

(a) straight-and-level flight–25 minutes,
(b) turns–25 minutes,
(c) climbs and descents–25 minutes, and
(d) recovery from unusual attitudes–15 minutes.

An example of the approximate time to be devoted to the presentation and practice of the elements of a 90-minute flight instructional period on "ground reference maneuvers" could be:

(a) preflight instruction–10 minutes,
(b) instructor demonstrations–25 minutes,
(c) pilot applicant practice–45 minutes, and
(d) postflight critique–10 minutes.

2. **Equipment.** This includes all instructional materials and training aids required to teach the lesson. For a ground instruction period, such items as films, slides, mockups, charts, computers, and reference materials should be included. For example, the equipment for a ground instructional period on "maneuvering by reference to flight instruments" could include the following:

(a) an instrument panel mockup,
(b) a copy of the FAA Instrument Flying Handbook, AC 61-27C,
(c) selected slides on instrument flying and
(d) chalkboard or graphic pad.

For an instructional flight period on "ground reference maneuvers," the equipment should include at least:

(a) a chalkboard or graphic pad for preflight discussion,
(b) a copy of the FAA Flight Training Handbook, AC 61-21, and
(c) an IFR visor for maneuvers reviewed.

3. **Objective.** The objective of the lesson should be clearly stated in terms of desired pilot applicant learning outcomes. The objective is the reason for the lesson—what the instructor expects the pilot applicant to know or do at the completion of the lesson.

The objective for a ground instruction period on "maneuvering by reference to flight instruments" could be, "To develop the pilot applicant's understanding of attitude instrument flying as related to straight-and-level flight, climbs and descents, and recovery from unusual attitudes." The objective for a flight instruction period on "ground reference maneuvers" could be, "To develop the pilot applicant's skill in planning and following a pattern over the ground compensating for wind drift at varying angles."

4. **Elements.** This is a statement of the elements of knowledge and skill necessary for the fulfillment of the lesson objective. This may include both elements previously learned and those to be introduced during this lesson. A statement of the elements of a ground school lesson on "maneuvering by reference to flight instruments" should include:

(a) straight-and-level flight,
(b) turns,

(c) climbs and descents, and
(d) recovery from unusual attitudes.

The elements of an instructional flight period on "ground reference maneuvers" could be:

(a) use of ground references to control path,
(b) observation and control of wind effect, and
(c) control of airplane attitude, altitude, and heading.

5. **Associated Maneuvers.** This is an optional lesson plan subject item, but is most beneficial to the primary flight pilot applicant. Flight instruction can only cover the four basic elements of flight: straight and level, turns, climbs, and descents. All other flight maneuvers can only be performed when the pilot applicant has mastered the basic elements and understands the association with the more advanced flight maneuvers. Pilot applicants should be thoroughly informed as to how each maneuver is associated directly or indirectly to other maneuvers, and the above basic elements of flight, in order to foster the development of progressive major blocks of pilot flight skills.

6. **Common Errors.** Although it is important to give praise and credit when deserved, it is equally important to identify mistakes and failures. **To tell pilot applicants that they have made errors and not provide explanations does not help them.** If a pilot applicant has made an earnest effort but is told that the performance is not satisfactory, with no other explanation, frustration occurs.

Common errors cannot be corrected if they are not identified, and if they are not identified, they will probably be perpetuated through faulty practice. If, on the other hand, the pilot applicant is briefed on the errors made and is told how to correct them, progress and accomplishment can be made.

Corrections or the explanations of errors in performance should point out the elements in which the deficiencies are believed to have originated and, if possible, appropriate corrective measures should be suggested. Correction of pilot applicant's errors should not include the practice of taking the controls away from the pilot applicant every time a mistake is made. A pilot may perform a procedure or maneuver correctly and not fully understand the principles and objective involved. When this is suspected by the flight instructor, the pilot applicant should be required to vary the performance of the maneuver slightly, combine it with other operations, or apply the same elements to the performance of other maneuvers. A pilot applicant who does not understand the principles involved will probably not be able to do this successfully.

To improve, one must not only acknowledge mistakes, but also make an effort to correct them. The person who lacks the desire to improve is not likely to make the effort, and consequently will continue to practice errors. The skillful flight instructor relates the lesson objective to the pilot applicant's ambitions and needs and, in so doing, builds on the pilot applicant's natural enthusiasm. In learning some simple skills, pilot applicants can discover their own errors quite easily. In learning others, such as complex aircraft flight maneuvers, or flight duties, mistakes are not always apparent, or the learner may know that something is wrong but not know how to correct it. In any case, the flight instructor provides a helpful and often critical function in making certain that the pilot applicants are aware of their progress. It is perhaps as important for pilot applicants to know when they are right as when they are wrong. They should be told as soon after the performance as possible, for they should not be allowed to practice mistakes. It is more difficult to unlearn a mistake and then learn it correctly, than to learn correctly in the first place.

> NOTE: No one, including the pilot applicant expects a flight instructor to be perfect. The instructor can win the respect of pilot applicant by honestly acknowledging mistakes. If the instructor tries to cover up or bluff, the pilot applicant will be quick to sense it. Such behavior tends to destroy pilot applicant confidence. **If in doubt about some point, the flight instructor should admit it to the pilot applicant.**

7. **Instructor's Actions.** This is a statement of the instructor's proposed procedures for presenting the elements of knowledge and performance involved in the lesson. Utilizing a combination of the lecture and the demonstration–performance methods, the instructor's actions during a ground instruction period on "maneuvering by reference to flight instruments" could be somewhat as follows:

(a) discusses objective,
(b) discusses concept of attitude instrument flying,

(c) discusses and demonstrates straight-and-level flight from the standpoint of pitch, bank, power control, and trim, using an instrument panel mockup or chalkboard,
(d) discusses and demonstrates turns from the standpoint of pitch, bank, power control and trim, using an instrument panel mockup or chalkboard or graphic pad,
(e) discusses and demonstrates climbs and descents from the standpoint of pitch, bank, power control, and trim, using an instrument panel mockup or chalkboard,
(f) discusses and demonstrates recovery from unusual attitudes,
(g) assigns individual pilot applicants the task of describing, and demonstrating, by means of an instrument panel mockup or graphic pad, the control of an airplane by reference to flight instruments and
(h) critiques pilot applicant presentation.

The instructor's action during a flight instruction period on "ground reference maneuvers" could be:

(a) discusses objective,
(b) diagrams "S" turns, turns around a point, and rectangular course on chalkboard,
(c) demonstrates following a road and coaches pilot applicant practice,
(d) demonstrates "S" turns and coaches pilot applicant practice,
(e) demonstrates turns around a point and coaches pilot applicant practice,
(f) demonstrates rectangular course and coaches pilot applicant practice, and
(g) conducts postflight critique.

8. Pilot's Actions (Applicant). This is a statement and/or action of desired pilot applicant responses to instruction. The pilot applicant's actions during a ground instruction lesson "maneuvering by reference to flight instruments" could be:

(a) discusses objective,
(b) listens, takes notes, and asks pertinent questions as the instructor lectures and demonstrates,
(c) visualizes instrument maneuvers as the instructor lectures and demonstrates,
(d) presents maneuvers, and
(e) responds to questions posed by the instructor.

The pilot applicant's actions during an instructional flight period on "ground reference maneuvers" could be:

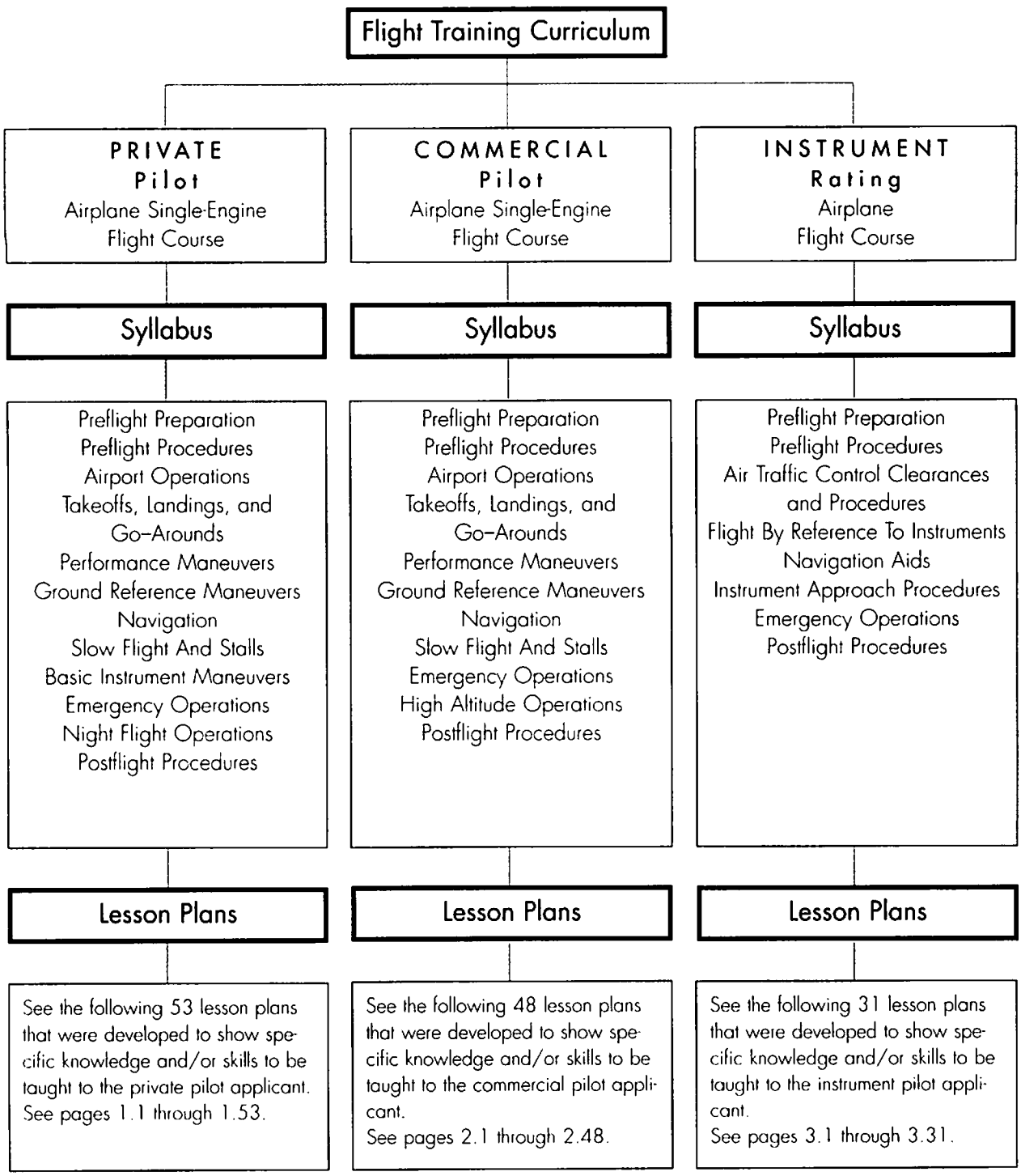
(a) discusses objective,
(b) asks pertinent questions during preflight briefing,
(c) at instructor's direction, reviews and practices power-off stalls and flight at minimum controllable airspeed,
(d) performs ground reference maneuvers as directed by instructor,
(e) asks pertinent questions both during flight and the postflight critique, and
(f) responds to questions posed by the instructor.

9. Completion Standards. This is the evaluation basis for determining how well the pilot applicant has met the lesson objective, in terms of knowledge and skill. For a ground instruction lesson on "maneuvering by reference to flight instruments," the evaluation may be accomplished by oral quizzing or by means of a short written test.

The evaluation at the end of a flight instruction period on "ground reference maneuvers" could be made from the standpoint of coordination, division of attention, orientation, proper wind drift correction, and accuracy in the maintenance of headings, altitude, and airspeed.

10. References. Again this is an optional lesson plan item. However, when available it has proven to be an effective tool for students desiring additional information or explanation, or for the flight instructor who may not have current instructional skills regarding the maneuvers or procedures which are currently required to be taught.

NOTE: See Lesson Plan Format on page XXI.



Curriculum:	All the courses of study offered, three for this flight instruction manual.
Syllabus:	The form of the syllabus may vary, but it is always in the form of an abstract or digest of the course of training. It consists of the main points "blocks of learning" to be completed in the most efficient order.
Lesson Plan:	Is a written outline of a method or procedure of presenting specific information and/or skills, for a single instructional period, designed to encourage the achievement of some clearly expressed objective, in a safe, thorough, and cost effective manner.

Chart 1

DATE
01/03/00

Lesson Plan Format

Lesson Plan Preparation

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT
Erin C. Reber

SCHEDULE

- ☐ CFI must estimate time for planned lesson periods
- ☐ Preparation .2
- ☐ Explanation and Demonstration .5
- ☐ Application, Trial and Practice 1.5
- ☐ Review and Evaluation Critique .5
- ☐ Preview of Next Lesson and Study Assignments .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ CFI to ensure equipment available and acceptable
- ☐ Course Syllabus and PTS Task(s) Lesson Plan(s)
- ☐ Models or Handees (Illustrative Hand Motions)
- ☐ Charts, Diagrams, and Performance Tables
- ☐ Audiovisual Courses, Computer and Modem
- ☐ Films, Mockups, Slides, Easel, Chalkboard
- ☐ Airplane, Airworthy and Pilot Personal Items, etc.

OBJECTIVE

☐ 1. **The objectives should be clearly established in terms of precisely what is to be learned by the pilot applicant (student)**, the mental and physical skills to be developed, and the standard of performance expected at the end of the lesson.

☐ 2. In other words, exactly what the instructor expects the pilot applicant to know or do at the completion of the lesson. **The objective is the purpose or reason for the lesson.**

ELEMENTS

☐ 1. **A statement of the elements, of knowledge and skills which will be necessary for the fulfillment of the lesson objectives.** (element = basic part of a whole; an essential, principle, fact, etc.)

☐ 2. This list of elements may include both elements previously learned and those to be introduced during the current lesson.

COMMON ERRORS

☐ 1. This is **a list of common errors frequently experienced by pilot applicant learning** and/or performing a maneuver or procedure for the first time.

☐ 2. The flight instructor must know the common errors associated with, and/or related to each of the Practical Test Standards (PTS) task(s) required to be taught to and learned by the pilot applicant.

☐ 3. It is the obligation of the flight instructor to identify common errors in the pilot's execution of assigned flight task(s), and to even a greater extent, the flight instructor has a responsibility to point out the specific elements in which the deficiencies are believed to have originated, then advise and suggest the appropriate corrective actions or measures that should be implemented to insure the pilot's successful flight task accomplishment.

INSTRUCTOR'S ACTIONS

☐ 1. This is **a statement of the instructor's proposed procedures for presenting the elements of knowledge**, and the extent of any performance involved in the lesson.

☐ 2. Create helpful instructor-student relationship.

☐ 3. Use the demonstration-performance method of teaching with its five essential phases:
- (a) explanation,
- (b) demonstration,
- (c) pilot applicant performance,
- (d) instructor supervision, and
- (e) evaluation.

☐ 4. **Establish safety policies and procedures.**

☐ 5. **Make study assignments, preview lessons.**

STUDENT'S ACTIONS

☐ 1. This is **a statement of desired pilot applicants' responses to instruction**, such as-
- (a) Preparedness and promptness.
- (b) Study assignments and/or homework
- (c) Listen, take notes, and ask pertinent questions as the instructor lectures and demonstrates the lesson objective.
- (d) Participate in discussions.
- (e) Visualize procedures and maneuvers.
- (f) Respond to test and/or questions.
- (g) Adhere to all safety procedures.
- (h) Practice procedures and maneuvers

COMPLETION STANDARDS

☐ 1. This is the **evaluation basis for determining how well the pilot applicant has learned the objective of the lesson in terms of knowledge and skill, and the pilot applicant must be informed of the system.**

☐ 2. The means and the program proposed to evaluate the student's learning and accomplishments should include the specific standards of learning and proficiency expected through the following:
- (a) Oral quizzing
- (b) Practical demonstrations
- (c) Written test examinations
- (d) Applying appropriate standards

☐ 3. According to the FAA, **"Consistently exceeding tolerances or failure to take prompt corrective action when tolerances are exceeded, is unsatisfactory performance."**

REFERENCES

FAA-H-8083-9	Aviation Instructor's Handbook	AIM	Aeronautical Information Manual
AC 61-23B	Pilot's Handbook Of Aeronautical Knowledge	A/FD	Airport/Facility Directory
CFR	Title 14 of the Code of Federal Regulations	AFM	Approved Airplane Flight Manual

Notice

On January 24, 1994, the Federal Aviation Administration issued an internal memorandum to all divisions of the agency regarding the improper use of the term "FAR" , which states in part as follows;

> "(FAR is not a legal designation. The correct reference is to Title 14 of the Code Of Federal Regulations, i. e., 14 CFR part XXX. FAR, as a legal term, actually refers to the Federal Acquisition Regulations.)"
>
> "The term 'FAR' may not be used in legal documents, such as preambles to NPRM's or final rules, or other documents, the text of which appears in the Federal Register. As to correspondence, while there is no written directive, there is a simple way to avoid any problem. The writer can begin by referring to, for example, section 121.383 of the 'Federal Aviation Regulations,' but the reference should be followed by '(14 CFR section 121.383)'....."

Therefore, the lesson plans in this book have used the correct legal designation, Title 14 of the Code Of Federal Regulations, as stated above. However in the Special Reference Supplements section of this handbook where the Federal Aviation Administration's Advisory Circulars are reprinted as pertinent references to the lesson plans, they are reprinted "as published" with the improper use of the term "FAR". As new Advisory Circulars are published by the FAA, they will use the correct reference to Title 14 of the Code Of Federal Regulations.

It is suggested, that all Flight Instructors and FAA Designated Pilot Examiners who are REQUIRED to sign and/or endorse FAA application forms or pilot applicant logbooks, etc. use the correct and legal regulation reference which is: Title 14 of the Code Of Federal Regulations.

Ed Quinlan

DATE

Certificates and Documents

Preflight Preparation

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Pilot Certificate, Medical and Logbook	.2
☐ Airplane Documents, Records and Logs	.5
☐ CFR's Part 61 and 91	.5
☐ Weight and Balance Problems	.5
☐ Critique and Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Markings and Placards
- ☐ Pilot's Logbook and/or Flight Record
- ☐ Airplane Maintenance Records (Logs)

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to certificates and documents by explaining the appropriate –
- (a) pilot certificate, privileges and limitations.
- (b) medical certificate, class and duration.
- (c) pilot logbook or flight record, required entries.

☐ 2. Exhibits knowledge of the elements related to certificates and documents by locating and explaining the –
- (a) airworthiness and registration certificates.
- (b) operating limitations, placards, instrument markings, handbooks, and manuals.
- (c) weight and balance data, including the equipment list.
- (d) airworthiness directives and compliance records, maintenance requirements, tests, and appropriate records.

ELEMENTS

- ☐ 1. FAA–Approved Airplane Flight Manual
- ☐ 2. Airframe, engine, and propeller logs
- ☐ 3. Code of Federal Regulations familiarity
- ☐ 4. Advisory Circulars (AC's) familiarity
- ☐ 5. Airworthiness Directives (AD's)
- ☐ 6. ARROWS (acronym) checklist

- A Airworthiness certificate
- R Registration certificate
- R Radio station FCC license
- O Operating limitations
- W Weight and balance/equipment list
- S Supplemental type certificate (STC)

COMMON ERRORS

- ☐ 1. Confused about medical expiration date
- ☐ 2. Misreading inspection records
- ☐ 3. Exceeds weight or balance criteria
- ☐ 4. Obsolete equipment list
- ☐ 5. Misreading airworthiness expiration date
- ☐ 6. Claims operating limitations complicated

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Explain pilot and medical certificates, (privileges, limitations, and durations), referent, CFR's.
- ☐ 3. Demonstrate correct pilot flight log maintenance, and posting guidelines.
- ☐ 4. Familiarize pilot with the existence, location and correct utilization of: approved airplane flight manual, markings, and placards, maintenance inspections and appropriate records and weight and balance, performance mandates.
- ☐ 5. Stress the importance of adherence to all limitations and restrictions for both the pilot and airplane.
- ☐ 6. Conduct a review of procedures and techniques, and preview the next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Become acquainted with all the above specified documents. Participate in the examination and review of each item.
- ☐ 3. Study and comprehend the application and pertinence of each subject item, including limitations and durations.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the location, validation, and durations of the above mentioned documents required to be on the pilot's person, or on board the airplane.
- ☐ 2. Pilot has located, and interpreted pertinent regulations in the CFR's.
- ☐ 3. Pilot has explained the significance of airworthiness, maintenance requirements, and operating limitations.
- ☐ 4. Pilot has demonstrated competence by completing an oral examination, and calculating and resolving weight and balance problems accurately.

REFERENCES

CFR-Part 61	Certification of Pilots and Flight Instructors	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
CFR-Part 91	General Operating and Flight Rules	AC 91-23	Pilot's Weight and Balance Handbook
AC 61-21A	Flight Training Handbook	AFM	Approved Airplane Flight Manual

DATE

Weather Information

Preflight Preparation

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Weather Sources	.2
☐ Obtaining Weather Briefing	.3
☐ Interpretation and Analyzation	.3
☐ Flight Decisions (Pilot Judgment)	.2
☐ Critique and Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Aeronautical Information Manual (Preflight)
- ☐ Telephone 800–WX–BRIEF
- ☐ Computer and Modem (DUATS)
- ☐ Weather Information Recording Form
- ☐ CFR 91.103, 91.155
- ☐ ICAO METAR/TAF Code Format

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to weather information by analyzing weather reports and forecasts from various sources with emphasis on –
   - (a) PIREP's.
   - (b) SIGMET's and AIRMET's.
   - (c) wind shear reports.

☐ 2. Makes a competent "go/no-go" decision based on available weather information.

ELEMENTS

- ☐ 1. Winds aloft forecast vs. planned altitude
- ☐ 2. Temperature/dew point spread vs. fog
- ☐ 3. Adverse weather and severity
- ☐ 4. Closest VMC or IMC weather conditions
- ☐ 5. Weather data and information sources
- ☐ 6. Judgment go/no-go decision
- ☐ 7. Weather briefing procedures
- ☐ 8. Aviation Routine Weather Report (METAR)
- ☐ 9. Terminal Aerodrome Forecast (TAF)
- ☐ 10. Weather briefing phraseology
- ☐ 11. Freezing levels and ice reports (PIREP's)
- ☐ 12. Information interpretation and analysis
- ☐ 13. Weather briefer, information needed –
  - (a) Name and/or aircraft number
  - (b) Type of aircraft
  - (c) VFR or IFR
  - (d) Route and terminal stops
  - (e) Time of flight, departure and arrival

COMMON ERRORS

- ☐ 1. Failed to request a detailed briefing
- ☐ 2. No NOTAM information obtained
- ☐ 3. Relied on memory, no written notes
- ☐ 4. Inadequate winds aloft information

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Acquaint pilot with all weather information sources, and the ICAO METAR/TAF Code Format
- ☐ 3. Introduce the pilot to the flight planner form and furnish pilot with a copy.
- ☐ 4. Demonstrate and explain obtaining and recording accurately a complete preflight weather briefing, which should include: weather synopsis, adverse conditions, current weather, METAR Aviation Routine Weather Reports (hourly sequence), FA–Area Forecast, en route forecast, destination TAF–Terminal Aerodrome Forecast, FD–Winds and Temperatures Aloft, Radar Reports (RAREP's), SIGMET's, AIRMET's, and Notices to Airmen (NOTAM's).
- ☐ 5. Passionately and unconditionally advise pilot to remember: **"When in doubt, wait it out!"**
- ☐ 6. Explain and discuss weather data, interpretations and pilot's analyzations.
- ☐ 7. Critique pilot on judgment factors and pilot-in-command (PIC) responsibility.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Become acquainted with all the above sources of weather information available for preflight planning.
- ☐ 3. Participate in the examination and review of data, charts, reports, etc.
- ☐ 4. Pilot will obtain a standard weather briefing for each flight, and make a detailed and legible record of all information conveyed by the briefer. At the conclusion of all briefings, pilot will request further explanation of any data or terms (abbreviations etc.) not understood. Pilot has a legal responsibility to obtain and understand all available weather affecting flight.

COMPLETION STANDARDS

- ☐ 1. Exhibited knowledge of aviation weather information by obtaining, reading, and analyzing all of the above items noted in the objective.
- ☐ 2. Pilot has made a competent go/no-go decision for each and every proposed flight, based on the current and forecasted weather reports, type of aircraft and equipment, personal flying ability and experience, and physical limitations, and decided if the flight should be delayed, postponed, or canceled.
- ☐ 3. Pilot routinely received en route weather reports, and filed PIREP's when appropriate with FSS.

REFERENCES

AC 00-6A	Aviation Weather	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 00-45D	Aviation Weather Services	AC 61-84B	Role of Preflight Preparation
AC 61-21A	Flight Training Handbook	FAA P-8740-30	How To Obtain A Good Weather Briefing

DATE

Cross-Country Flight Planning

Preflight Preparation

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Legal Requirements	.3
☐ Weather Briefing and NOTAMS	.5
☐ Airplane Data and Weight and Balance	.5
☐ Selection of Charts and Course	1.0
☐ Navigation Log and Flight Plan	.5
☐ Pilot Application and Trial and Practice	1.0
☐ Critique and Preview of Next Lesson	.5

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aeronautical Charts (Current)
- ☐ Aeronautical Information Manual (AIM)
- ☐ Navigation Computer and Plotter
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ Flight Plan Form, Navigation Log, and CFR's

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to cross-country flight planning by presenting and explaining a preplanned VFR cross-country flight near the maximum range of the airplane, as previously assigned by the examiner. The final flight plan shall include real-time weather to the first fuel stop, with maximum allowable passenger and baggage loads.
- ☐ 2. Uses appropriate, current aeronautical charts.
- ☐ 3. Plots a course for the intended route of flight.
- ☐ 4. Identifies airspace, obstructions, and terrain features.
- ☐ 5. Selects easily identifiable en route checkpoints.
- ☐ 6. Selects the most favorable altitudes, considering weather conditions and equipment capabilities.
- ☐ 7. Computes headings, flight time, and fuel requirements.
- ☐ 8. Selects appropriate navigation systems/facilities and communication frequencies.
- ☐ 9. Confirms availability of alternate airports.
- ☐ 10. Extracts and records pertinent information from NOTAM's, the Airport/ Facility Directory, and other flight publications.
- ☐ 11. Completes a navigation log and simulates filing a VFR flight plan.

ELEMENTS

- ☐ 1. Obtaining all necessary data
- ☐ 2. Providing appropriate equipment
- ☐ 3. Preparation of VFR flight plan
- ☐ 4. Plotting route, intermediate stops, checkpoints, and alternates
- ☐ 5. Preparation of navigation log
- ☐ 6. Performance data, limitations awareness
- ☐ 7. Weather briefing procedures
- ☐ 8. Airspace classification recognition
- ☐ 9. Checklist utilization recommended

COMMON ERRORS

- ☐ 1. Failure to comply with CFR 91.103
- ☐ 2. Failure to procure charts, computers, etc.
- ☐ 3. Plotting course and/or checkpoints faulty
- ☐ 4. Navigation log impractical
- ☐ 5. Airport/ Facility Directory not utilized
- ☐ 6. Fuel reserve computation inaccurate
- ☐ 7. Desired performance exceeds limitations
- ☐ 8. Weight and balance calculations incorrect
- ☐ 9. VFR flight plan, failed to file and/or open
- ☐ 10. Weather briefing, failed to procure

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required performance criteria.
- ☐ 2. Inform Pilot that Code of Federal Regulations require each Pilot In Command, become familiar with all available information concerning proposed flight.
- ☐ 3. Introduce the various sources of aeronautical information such as listed in the equipment and reference sections of this form.
- ☐ 4. Demonstrate how to search for relevant data to be utilized by the pilot to establish the following: VFR weather conditions at, (departure, en route, destination, and alternate), NOTAMs, wind, temperature, density altitude, takeoff distance, current chart selection, routes, (destination and alternate), checkpoints, proposed altitude, WCA, magnetic courses, distances, TAS, GS, ETE, ETA, communications/navigation frequencies, airport facilities data, landing performance, flight and reserve fuel required, and establish that weight and balance are within approved limits.
- ☐ 5. Demonstrate how to complete navigation log, flight plan, and the procedures for filing with FAA/FSS.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Practice flight planning skills to achieve competent execution of the objective.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the ability to plan a cross-country flight of a duration near the range of the airplane, including navigation log and flight plan, as directed, adhering to all of the objective criteria, with accuracy and rational judgment.

REFERENCES

AC 61-21A	Flight Training Handbook (165)	AC 91-23	Pilot's Weight and Balance Handbook
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	CFR	Part 91.103
AC 61-84B	Role of Preflight Preparation	A/FD	Airport/ Facility Directory

DATE

National Airspace System

Preflight Preparation

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Present and Explain National Airspace System .5
- ☐ CFI Demonstrate .5
- ☐ Pilot Application, Trial and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aeronautical Information Manual (AIM)
- ☐ Pilot's Logbook and/or Flight Record
- ☐ VFR Terminal Area Aeronautical Chart(s)
- ☐ VFR Sectional Aeronautical Chart(s)

OBJECTIVE

The FAA requires that the pilot applicant exhibits knowledge of the elements related to the National Airspace System by explaining:

☐ 1. Basic VFR Weather Minimums– for all classes of airspace.

☐ 2. Airspace classes – their boundaries, pilot certification, and airplane equipment requirements for the following –

(a) Class A.
(b) Class B.
(c) Class C.
(d) Class D.
(e) Class E.
(f) Class G.

☐ 3. Special use airspace and other airspace areas.

ELEMENTS

- ☐ 1. International civil aviation organization
- ☐ 2. Aeronautical charting conventions or symbols
- ☐ 3. Weather requirements vs. airspace class
- ☐ 4. Transponder Mode-C area(s)
- ☐ 5. Airspace parameters
- ☐ 6. Special use airspace (SUA)
- ☐ 7. Pilot requirements vs. airspace classification
- ☐ 8. Airplane airspeeds
- ☐ 9. Student pilot training for Class B airspace
- ☐ 10. Airspace controlling agencies

COMMON ERRORS

- ☐ 1. Position and airspace awareness inaccurate
- ☐ 2. VFR aeronautical chart(s) expired
- ☐ 3. Mode-C operation area disregarded
- ☐ 4. Special use airspace (SUA) misconstrued

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the chapter on "Airspace" in the AIM, and CFR part 71.
- ☐ 3. Demonstrate and explain basic VFR (VFR 3SM/1000' ceiling) and SVFR weather minimums. No VFR in class A; Class B is 3SM visibility and clear of clouds; Class C, D, and E is 3SM visibility and 500' below and 1000' above and 2000' horizontal from clouds, below 10,000' MSL. At or above 10,000' MSL it is 5SM visibility and 1,000' below and 1,000' above and 1SM horizontal from clouds. Review the altitude levels and day and night weather minimums for class G airspace.
- ☐ 4. Demonstrate and explain the VFR navigation chart symbology, used to depict the various airspace classification boundaries, and perimeters including the pilot requirements, and airplane equipment.
- ☐ 5. Review the graphics used to distinguish the classes of airspace, such as solid blue circular lines for class B, solid magenta circular lines for class C, blue segmented circular lines for class D, and magenta segmented circular lines for class E, also review the required Mode-C operation areas.
- ☐ 6. Explain airspace memory aid; A is for Altitude (anything above FL 180); B is for Big (big airplanes); C is for Crowded or congested airports; D is for Dialogue (areas where you have to talk to controllers); E is for Elsewhere (any other controlled airspace, such as transitions areas and airways); G is for Go for it (uncontrolled airspace)
- ☐ 7. Demonstrate and explain each of the SUA's, such as prohibited area, restricted area, warning area, military operations areas (MOA), alert area, and controlled firing areas (CFA) on the charts.
- ☐ 8. Conduct a lesson critique, to insure objective comprehension, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read and comprehend the chapter "Airspace" in the AIM, and CFR part 71.
- ☐ 3. Study the basic VFR weather minimum as published in the CFR's.
- ☐ 4. Study the VFR aeronautical chart(s) legend(s) specifically the airport traffic service and airspace information, including all the color and graphical depiction of airports and classes of airspace.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the basic VFR weather minimums for each of the classes and types of airspace for both day and night including SVFR weather requirements.
- ☐ 2. Pilot has located each airspace class, and all SUA's on the VFR aeronautical chart(s), and determined their boundaries, pilot certification, and airplane equipment requirements accurately.

REFERENCES

CFR Part 61, Part 71, and Part 91 | VFR-CUG Visual Flight Rules Chart User's Guide (NOAA)

DATE

Performance and Limitations

Preflight Preparation

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Present Performance Data and Location .5
- ☐ CFI Demonstrate Weight and Balance .5
- ☐ Pilot Application, Trial and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Equipment List
- ☐ Aircraft Weight and Balance Data
- ☐ Aircraft Markings and Placards
- ☐ Title 14 of the Code of Federal Regulations (CFR)

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to performance and limitations by explaining the use of charts, tables, and data, if available from the manufacturer, to determine performance, including takeoff, climb, cruise, range, and endurance, and the adverse effects of exceeding limitations.
- ☐ 2. Computes weight and balance, including adding, removing, and shifting weight. Determines if the weight and center of gravity will remain within limits during all phases of flight.
- ☐ 3. Describes the effects of atmospheric conditions on the airplane's performance.
- ☐ 4. Determines whether the computed performance is within the airplane's capabilities and operating limitations.

ELEMENTS

- ☐ 1. Awareness of airplane's specifications
- ☐ 2. Make frequent use of manufacturer's published Pilot's Operating Handbook
- ☐ 3. Utilization of current weather data to determine airplane performance
- ☐ 4. PIC must have a complete understanding of the following items for each airplane–
  - (a) limitations
  - (b) emergency procedures
  - (c) normal procedures
  - (d) performance data
  - (e) weight and balance/equipment list
  - (f) systems and descriptions
  - (g) service and maintenance
  - (h) optional systems procedures
- ☐ 5. Stress the significance of the Three H's, High, Hot, and Humid conditions vs. airplane performance

COMMON ERRORS

- ☐ 1. Impulsive decision practices
- ☐ 2. Defective judgment
- ☐ 3. Atmospheric conditions ignored
- ☐ 4. Misinterpreted charts, tables, and data
- ☐ 5. Desired performance exceeds limitations
- ☐ 6. Weight and balance calculations incorrect

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Inform pilot of the two principal reasons for weight and balance limits:
  - (a) effect on structure and performance characteristics; and
  - (b) the location of the weight will adversely affect stall and spin recovery and stability.
- ☐ 3. Demonstrate the use of all performance information in preflight planning, including the effects of density altitude. Further, with the use of the above charts, tables, and data, show that the most critical conditions of takeoff performance are the result of a combination of heavy loads, unfavorable runway conditions, winds, high temperatures, high airport elevations, and high humidity.
- ☐ 4. Assign weight and balance, and performance problems to pilot to calculate solutions and make flight recommendations, including flight distance, ETE, and fuel stops.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Become acquainted with all the above specified documents. Participate in the examination and review of each item.
- ☐ 3. Complete assigned problems and make flight decisions based on AFM published data.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the effects of exceeding weight or balance during any phase of flight.
- ☐ 2. Pilot has made weight and balance calculations accurately.
- ☐ 3. Pilot has determined airplane performance using the above criteria and was able to make reasonable flight decisions based on the analysis of all relevant data.
- ☐ 4. Pilot understands the airplane performance is much better in cold dry air than in hot moist air, and low density altitude versus high density altitude.

REFERENCES

AC 61-21A	Flight Training Handbook (301)	AC 61-84B	Role of Preflight Preparation
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	AFM	Approved Airplane Flight Manual
AC 91-23	Pilot's Weight and Balance Handbook	CFR	Code of Federal Regulations, 91.9, 91.103

DATE

Operation of (Airplane) Systems

Preflight Preparation

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ CFI Explanation and Demonstration .5
- ☐ Pilot Rehearsing Systems Operations 1.0
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Equipment List
- ☐ Aircraft Markings and Placards, (CFR 91.9)

OBJECTIVE

The FAA requires that the pilot applicant exhibits knowledge of the elements related to the operation of systems on the airplane provided for the flight test by explaining at least three of the following:

- ☐ 1. Primary flight controls and trim.
- ☐ 2. Flaps, leading edge devices, and spoilers.
- ☐ 3. Powerplant.
- ☐ 4. Propeller.
- ☐ 5. Landing gear.
- ☐ 6. Fuel, oil, and hydraulic systems.
- ☐ 7. Electrical system.
- ☐ 8. Pitot–static system, vacuum/pressure system and associated flight instruments.
- ☐ 9. Environmental system.
- ☐ 10. Deicing and anti–icing systems.
- ☐ 11. Avionics system.

ELEMENTS

- ☐ 1. Airplane systems information available
- ☐ 2. Placards and cautions, compliance
- ☐ 3. Operating directive, utilization/adherence
- ☐ 4. Avionics operating instructions
- ☐ 5. Checklist and systematic application
- ☐ 6. Maintenance requirements and validation
- ☐ 7. Utilization of data, charts, and warnings
- ☐ 8. Flight controls, functions and effects

COMMON ERRORS

- ☐ 1. Systems instructions, failure to study
- ☐ 2. Recommended procedures ignored
- ☐ 3. Confused by data, charts and warnings
- ☐ 4. Checklist, disregard recommendations

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Demonstrate and simultaneously explain and acquaint pilot with the manufacturer's FAA–Approved Airplane Flight Manual (AFM), and/or Pilot's Operating Handbook (POH). Instruct pilot how the manual(s) and supplemental data is to be utilized to insure that the pilot becomes thoroughly familiar with all the various airplane systems, including the airframe, and all the related controls, such as flaps, trim tabs, main landing gear and nose gear, etc. Instruct pilot regarding the type of powerplant and component systems, such as fuel, hydraulic, electrical, oil etc. Instruct pilot, regarding the type of propeller and its proper operation and care. Additionally review all manufacturer's maintenance and inspection recommendations.
- ☐ 3. Direct pilot to thoroughly study the FAA–Approved Airplane Flight Manual (AFM), and/or Pilot's Operating Handbook (POH).
- ☐ 4. Conduct a review of procedures and techniques, and preview the next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read and become familiar with the FAA approved Airplane Flight Manual and/or the Pilot's Operating Handbook for a specific airplane, and the proper operation of all systems.
- ☐ 3. Become acquainted with all the above specified systems and components.
- ☐ 4. Study and comprehend the operation and function of each of the subject items, including evaluating function and performance and limitations.
- ☐ 5. Participate in the examination and review of each system and component.

COMPLETION STANDARDS

- ☐ 1. Pilot has located all systems and manufacturer's operating instructions.
- ☐ 2. Pilot has demonstrated a basic understanding of the airframe, powerplant, and related systems by competent operation or explanation.
- ☐ 3. Pilot has located and demonstrated or explained the manufacturer's recommended operation, function, limitations, and required inspection and/or maintenance of all applicable airplane systems listed in the above objective.

REFERENCES

AFM	Approved Airplane Flight Manual	AC 61-21A	Flight Training Handbook (11)
POH	Pilot's Operating Handbook	AC 61-84B	Role of Preflight Preparation

DATE

Minimum Equipment List

Preflight Preparation

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ CFR's Part 61 and 91 .2
- ☐ FAA Approved Airplane Equipment List .2
- ☐ Inoperative Instruments and Equipment Action .2
- ☐ Special Flight Permit Procedures .2
- ☐ Oral Examination of Pilot Applicant .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Equipment List
- ☐ Aircraft Markings and Placards
- ☐ Supplemental Type Certificate (STC)
- ☐ Airplane Maintenance Records (Logs)
- ☐ FAA Letter Of Authorization (LOA)

OBJECTIVE

The FAA requires that the pilot applicant exhibits knowledge of the elements related to the use of an approved Part 91 minimum equipment list by explaining:

- ☐ 1. Required instruments and equipment for day VFR and night VFR flight.
- ☐ 2. Procedures for operating the airplane with inoperative instruments and equipment.
- ☐ 3. Requirements and procedures for obtaining a special flight permit.

ELEMENTS

- ☐ 1. VFR–day required instruments & equipment
- ☐ 2. VFR–night required instruments & equipment
- ☐ 3. IFR required instruments and equipment
- ☐ 4. Airworthiness directive (AD), required items
- ☐ 5. Preflight inspection of minimum equipment
- ☐ 6. Minimum equipment list (MEL)
- ☐ 7. Inoperative equipment procedures
- ☐ 8. PIC is responsible for airworthiness decision
- ☐ 9. Types of operations – equipment list
- ☐ 10. Special flight permit(s) and required LOA

COMMON ERRORS

- ☐ 1. Minimum equipment list (MEL) disregard
- ☐ 2. Preflight inspection of equipment inadequate
- ☐ 3. Deactivated and placarded misunderstood
- ☐ 4. Flight beyond the intended operational limit

INSTRUCTOR'S ACTIONS

NOTE: This is not a required PTS flight operation.

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Advise the pilot of applicability of an approved minimum equipment list (MEL) which would also require that the airplane have within it a letter of authorization (LOA), constituting an STC.
- ☐ 3. Demonstrate and explain that in the absence of an MEL the pilot must abide by CFR 91.205, which states in part that the airplane must have the instruments and equipment specified for the type of intended operation, such as VFR–day, VFR–night, and IFR, and **the specific items of equipment listed for each type of operation must be aboard the airplane and in operable condition.**
- ☐ 4. Demonstrate and explain that upon the pilot's discovery of any inoperative instrument, or equipment that acceptable procedures must be followed to determine if the flight operation can safely and legally be conducted without that particular item. The following questions should be considered:
  - a. Is this equipment required by CFR 91.205, i.e., VFR–day equipment list?
  - b. Is this equipment required by CFR 91.207, i.e., ELT, for a training flight beyond 50NM?
  - c. Is this equipment required by CFR 91.215, i.e., ATC transponder and altitude reporting equipment, for flight in class A, B, and C airspace or above 10,000' MSL?
  - d. Is this equipment required by the airplane's equipment list for types–of–operations?
  - e. Is this equipment required by an airworthiness directive (AD)?

  If all questions are answered NO, then the inoperative equipment must be removed from the airplane or deactivated and placarded "**inoperative**" prior to flight departure.
- ☐ 5. Instruct the pilot on the procedure to obtain a special flight permit in accordance with CFR Part 21, and advise the pilot that the permit may only be issued for airplanes that are capable of safe flight and for the purpose of flying to a base for maintenance, or to a point of storage.
- ☐ 6. Test pilot by oral examination to determine complete comprehension of the above.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read and comprehend CFR Part 91.205. 91.207, 91.213, and 91.215.
- ☐ 3. Review the manufacturer's equipment list(s) in the FAA–Approved Airplane Flight Manual.
- ☐ 4. Review the requirements, limitations, and procedures for obtaining a special flight permit.

COMPLETION STANDARDS

- ☐ 1. Pilot has reviewed the CFR Part 91.205, and determined that the airplane was in compliance with the required instruments and equipment for VFR (day and night).
- ☐ 2. Pilot has explained in detail the proper procedure for removing or deactivating an inoperative item, and placarding the cockpit control, and making the required notation in the maintenance log.
- ☐ 3. Pilot has explained the procedures for obtaining a special flight permit and the limitations thereof.

REFERENCES

CFR, Part 91 General Operating and Flight Rules | POH Pilot's Operating Handbook

DATE

Aeromedical Factors

Preflight Preparation

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Explanation of Aeromedical Factors .5
- ☐ Code of Federal Regulations (CFR) .3
- ☐ Oral Examination of Pilot Applicant .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ Medical Handbook For Pilots AC 67-2
- ☐ Aeronautical Information Manual (AIM)

OBJECTIVE

The FAA requires that the pilot applicant exhibits knowledge of the elements related to aeromedical factors by explaining:

☐ 1. The symptoms, causes, effects, and corrective actions of at least three of the following –
- (a) hypoxia.
- (b) hyperventilation.
- (c) middle ear and sinus problems.
- (d) spatial disorientation.
- (e) motion sickness.
- (f) carbon monoxide poisoning.
- (g) stress and fatigue.

☐ 2. The effects of alcohol and over-the-counter drugs.

☐ 3. The effects of nitrogen excesses during scuba dives upon a pilot or passenger in flight.

ELEMENTS

☐ 1. Pilot is only partly prepared for safe flight if not familiar with the medical factors which affect performance

☐ 2. Physically fit, and psychologically sound

☐ 3. No person with any known medical deficiency may act as PIC or crewmember

☐ 4. Familiarity with appropriate Code of Federal Regulations and Advisory Circulars is imperative for safe flight

☐ 5. IMSAFE (acronym) checklist
- I Illness
- M Medication
- S Stress
- A Alcohol
- F Fatigue
- E Emotions

COMMON ERRORS

☐ 1. Aeromedical conditions are unfamiliar

☐ 2. Altitude effects, disregarded as serious

☐ 3. Night adaptation, impaired by bright light

☐ 4. Non-prescription drugs considered safe

☐ 5. Medical facts, inadequate understanding

☐ 6. Physical limits, pilot lacks awareness

INSTRUCTOR'S ACTIONS

☐ 1. Familiarize pilot with the existence of AC 67-2, Medical Handbook For Pilots, and the causes, symptoms and preventions for the above listed aeromedical conditions.

☐ 2. Advise pilot that adequate knowledge of the above aeromedical infirmities is vital to safe flight operations, and instruct pilot to avoid incidents known to cause or aggravate any of these disorders or conditions.

☐ 3. Examine pilot to determine that the basic comprehension of the subject has been acquired.

☐ 4. Inspect pilot's FAA Medical Certificate. If the pilot has not completed the required medical examination, advise pilot to visit an FAA Aviation Medical Examiner, as soon as possible.

PILOT'S ACTIONS

☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.

☐ 2. Study, review and comprehend the causes, symptoms and preventions for the above listed aeromedical conditions.

☐ 3. Acknowledge responsibility to consider the status of personal health and continue to stay informed on aeromedical facts and effects.

☐ 4. Establish understanding by answering oral examination questions.

COMPLETION STANDARDS

☐ 1. Pilot has by oral examination explained the importance of medical fitness for flightcrew and the elements related to the above listed aeromedical ailments.

☐ 2. Pilot understands that any use of alcohol or drugs, in any amount, could dangerously impair pilot's performance, and further, is a serious violation of CFR's.

☐ 3. Pilot is familiar with the section on medical facts for pilots located in the Aeronautical Information Manual (AIM), and is well informed regarding the subject of decompression sickness after scuba diving.

REFERENCES

CFR	61.23, 61.53, 91.17	AIM	Aeronautical Information Manual
AC 61-21A	Flight Training Handbook (6)	FAA P-8740-41	Medical Facts For Pilots
AC 67-2	Medical Handbook For Pilots		

DATE

Preflight (Visual) Inspection

Preflight Procedures

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Demonstrate Airplane Checklist Use .7
- ☐ CFI Explanation of Checklist Items .2
- ☐ Pilot Application, Trial and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Equipment List
- ☐ Airplane Manufacturer's Inspection Checklist
- ☐ Aircraft Markings and Placards

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to preflight inspection. This shall include which items must be inspected, the reasons for checking each item, and how to detect possible defects.

☐ 2. Inspects the airplane with reference to the checklist.

☐ 3. Verifies the airplane is in condition for safe flight.

ELEMENTS

- ☐ 1. Checklist is strongly recommended
- ☐ 2. Determine airplane's airworthy status
- ☐ 3. Habitual and reliable airplane inspection
- ☐ 4. Items for day, night or IFR operations
- ☐ 5. Airplane systems information available
- ☐ 6. Placards and cautions, compliance
- ☐ 7. Operating directive, utilization/adherence
- ☐ 8. Avionics operating instructions
- ☐ 9. Serious task that deserves attention
- ☐ 10. Fuel and oil, visually check quantities
- ☐ 11. Maintenance requirements and validation
- ☐ 12. AVIATE (acronym) checklist
  - A Annual inspection
  - V VOR equipment check
  - I 100 hour inspection procedure
  - A Altimeter/encoder check
  - T Transponder/altitude reporting
  - E Emergency locator transmitter

COMMON ERRORS

- ☐ 1. Checklist, disregard recommended use
- ☐ 2. Inspection, permitted interruptions
- ☐ 3. Discrepancies, inability to recognize
- ☐ 4. Fuel, failed to visually check quantity
- ☐ 5. Navigation lights, failed to check
- ☐ 6. Wheel chocks removed prematurely

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Inform the pilot that the airworthiness of the airplane is both a legal obligation and a direct responsibility.
- ☐ 3. Demonstrate by taking the necessary time, the fundamental processes and techniques of a complete and reliable preflight inspection using the manufacturer's recommended checklist.
- ☐ 4. Explain the reason for checking each item on the checklist.
- ☐ 5. Advise pilot if any apparent defects or discrepancies are discovered, or if doubt exists regarding the airworthiness, a FAA certificated mechanic or approved repair station or local FAA inspector should be consulted.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Pilot must become familiar with airplane by making a complete visual inspection with CFI, and examining each item or component on the manufacturer's recommended inspection checklist, while determining the reason for checking each item.
- ☐ 3. Request further explanation for any process or technique not completely comprehended.
- ☐ 4. Establish understanding by answering oral examination questions.

COMPLETION STANDARDS

- ☐ 1. Pilot has used the manufacturer's recommended inspection checklist, has located each component or item and explained the specific reason for the examination.
- ☐ 2. If pilot is in doubt about any item a FAA certificated mechanic will be consulted.
- ☐ 3. Pilot has made determinations regarding the airworthiness of the airplane.

REFERENCES

AC 61-21A	Flight Training Handbook (48)	POH	Pilot's Operating Handbook
AFM	Approved Airplane Flight Manual	CFR	Code of Federal Regulations

DATE

Cockpit Management

Preflight Procedures

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Safety, Efficiency, and Management .2
- ☐ Safety Belts, Seats, and Rudder Pedals .3
- ☐ Pilot Application, Trial and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Pilot Clip/Lapboard-Flashlight and Batteries
- ☐ Aeronautical Charts (Current)
- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ Manufacturer's Recommended Checklist

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to cockpit management procedures.
- ☐ 2. Ensures all loose items in the cockpit and cabin are secured.
- ☐ 3. Briefs passengers on the use of safety belts, shoulder harnesses, and emergency procedures.
- ☐ 4. Organizes material and equipment in a logical, efficient flow pattern.
- ☐ 5. Utilizes all appropriate checklists.

ELEMENTS

- ☐ 1. Checklist is strongly recommended
- ☐ 2. Essential materials, arranged efficiently
- ☐ 3. Habitual and efficient cockpit organization
- ☐ 4. Special regard for night or IFR operations
- ☐ 5. Flight progress, maintain current record
- ☐ 6. Equipment situated for efficient use
- ☐ 7. Passengers briefing procedures
- ☐ 8. Safety belts/shoulder harnesses secure
- ☐ 9. Seats/rudder pedals adjusted and locked
- ☐ 10. Aeronautical charts current and available
- ☐ 11. ARROWS (acronym) checklist
- ☐ 12. AVIATE (acronym) checklist

COMMON ERRORS

- ☐ 1. Equipment and materials, failed to secure
- ☐ 2. Materials not available for easy access
- ☐ 3. Flight progress, failed to maintain record
- ☐ 4. Seats not properly adjusted and locked
- ☐ 5. Passengers briefing not performed
- ☐ 6. Checklist and/or item(s) bypassed

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Verbally complete ARROWS and AVIATE acronym checklists to ensure that airplane and pilot are in airworthy condition and in full compliance with safety standard and CFR's.
- ☐ 3. Demonstrate and simultaneously explain the proper procedures, and techniques for adjusting seats, rudder pedals, safety belts and shoulder harnesses, to ensure good comfort and complete visibility, and full movement of the flight controls. Recommend efficient and convenient arrangement (readily available to the pilot) and securing of essential materials and equipment in the cockpit. Verbally complete and comply with all checklist and passenger safety briefings.
- ☐ 4. Check for loose articles in cockpit and ensure safety and cockpit visibility.
- ☐ 5. Demonstrate, continually, the habit of "good housekeeping".
- ☐ 6. Conduct a review of procedures and techniques, and preview the next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Become familiar with techniques and procedures used to manage cockpit items, equipment and duties, including the use of manufacturer's recommended checklist.
- ☐ 3. Demonstrate the habit of briefing the passengers on the use of safety belts and emergency procedures.
- ☐ 4. Practice the proper and safe adjustment of rudder pedals and pilot seat to ensure good comfort and visibility, and full movement of the flight controls.

COMPLETION STANDARDS

- ☐ 1. Before each flight pilot adjusts and locks the rudder pedals, pilot's seat and shoulder harness to insure comfort, ease of control movement and visibility.
- ☐ 2. Pilot realization that safe flying really begins on the ground.
- ☐ 3. Pilot has formed the habit of using manufacturer's recommended checklist to complete the cockpit duties while employing the techniques and procedures for proper organization and efficient utilization of required materials to avoid pilot apprehension and insure safety.

REFERENCES

AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 61-21A	Flight Training Handbook (49)
CFR	91.105, 91.107
POH	Pilot's Operating Handbook
AC 91-62	Use Of Child/Infant Seats In Aircraft
AC 91-65	Use Of Shoulder Harness In Passenger Seats
AC 135-12A	Passenger Safety Information Briefing and Briefing Cards

DATE

Engine Starting

Preflight Procedures

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Safety Precautions	.2
☐ Pilot's Use of Electric Starter	.3
☐ Hand Propping Airplane	.3
☐ Pilot Application, Trial and Practice	.5
☐ Critique and Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ Manufacturer's Recommended Checklist
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Safe and Appropriate Start Up Area
- ☐ Airport Runway and Taxiway Diagram

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to engine starting. This shall include the use of an external power source and starting under various atmospheric conditions, as appropriate.
- ☐ 2. Positions the airplane properly considering open hangars, other aircraft, the safety of nearby persons and property on the ramp, and surface conditions.
- ☐ 3. Accomplishes the correct starting procedure.
- ☐ 4. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Safety precautions, emphasize
- ☐ 2. Hand propping, procedures and dangers
- ☐ 3. Familiar with engine starting procedures
- ☐ 4. Propeller and propeller blast area, cleared
- ☐ 5. Overpriming versus fire hazards
- ☐ 6. Position lights, turn on before starting
- ☐ 7. Checklist and procedures, reiterate
- ☐ 8. Cold weather starting procedures

COMMON ERRORS

- ☐ 1. Checklist and/or item(s) bypassed
- ☐ 2. Oil pressure not checked immediately
- ☐ 3. Engine RPM operated excessively high
- ☐ 4. Propeller area not properly cleared
- ☐ 5. Engine preheat improperly applied
- ☐ 6. Engine priming excessive and unsafe

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Demonstrate positioning airplane in a safe area to insure that persons and property will not be struck by propeller blast or the debris from the ground and set brakes.
- ☐ 3. Pilot will be cautioned, due to the multitude of different engines and propellers, that only the manufacturer's recommended procedures and checklist for the specific airplane being flown should be utilized. Additionally pilot should be advised about the relationship between the amount of engine priming (fuel) and the outside air temperature (OAT), and cautioned about possible over priming, or pumping the throttle, which may cause raw fuel to accumulate, creating a fire hazard.
- ☐ 4. Advise pilot on cold weather and high altitude engine starting procedures as recommended.
- ☐ 5. Demonstrate and simultaneously explain the positioning of airplane, checking the propeller blast area, setting the brakes, and completing the manufacturer's recommended checklist to ensure a prompt safe engine start up, and reviewing the engine instrument indications immediately.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Position the airplane, and complete "Before Starting Engine" checklist.
- ☐ 3. Perform engine starting procedures as directed by the manufacturer's checklist while adhering to all safety precautions and lesson objective criteria.
- ☐ 4. Participate in the oral examination and review of engine starting procedures and techniques.

COMPLETION STANDARDS

- ☐ 1. Pilot has formed the habit of using manufacturer's recommended engine starting checklist for the particular airplane being used.
- ☐ 2. Pilot understands how to use different starting techniques and procedures depending on the various atmospheric conditions.
- ☐ 3. Pilot has demonstrated the habit of using safety precautions before starting engine.

REFERENCES

AC 61-21A	Flight Training Handbook (50)	AFM	Approved Airplane Flight Manual
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	CFR	91.13
AC 91-13C	Cold Weather Operation of Aircraft	FAA P-8740-13	Engine Operation For Pilots
AC 91-55	Reduction of Electrical Systems Failure Following Engine Starting		

DATE

Taxiing

Preflight Procedures

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ CFI Explanation of Taxi Procedures .3
- ☐ CFI Demonstration of Taxiing .2
- ☐ Directed Pilot Application and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ Aeronautical Information Manual
- ☐ Airport/ Facility Directory
- ☐ Airport Runway and Taxi Diagram
- ☐ Code of Federal Regulation 91.13
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to safe taxi procedures.
- ☐ 2. Positions the flight controls properly for the existing wind conditions.
- ☐ 3. Performs a brake check immediately after the airplane begins moving.
- ☐ 4. Controls direction and speed without excessive use of brakes.
- ☐ 5. Complies with airport markings, signals, and ATC clearances.
- ☐ 6. Avoids other aircraft and hazards.
- ☐ 7. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Safety precautions, emphasize
- ☐ 2. Speed awareness and control
- ☐ 3. Use of brakes, employ cautiously
- ☐ 4. Clearance(s), read-back and compliance
- ☐ 5. Position flight controls properly
- ☐ 6. Rules of right-of-way, use safely
- ☐ 7. Taxiing during low visibility
- ☐ 8. Crosswind weathervaning tendency
- ☐ 9. Brakes checked after first movement
- ☐ 10. Hand signals of linemen

COMMON ERRORS

- ☐ 1. Control improperly used versus wind
- ☐ 2. Wind direction awareness lacking
- ☐ 3. Yellow or center line disregarded
- ☐ 4. Taxied with excessive speed
- ☐ 5. Brakes, applying accidentally or excessively
- ☐ 6. Aileron controls, tried to steer with
- ☐ 7. Power applied inconsistently or radically
- ☐ 8. Rudder use erratic and unsafe

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Advise pilot, approval must be obtained prior to moving an aircraft onto the movement area during the hours an airport traffic control tower is in operation.
- ☐ 3. Demonstrate proper use of all elements during taxiing operations.
- ☐ 4. Demonstrate speed control, where movement of the airplane is dependent on the throttle, and when the throttle is closed the airplane can be stopped promptly.
- ☐ 5. Demonstrate the proper positioning of flight controls versus wind direction.
- ☐ 6. Advise pilot that CFR's forbid careless and reckless operations of the airplane.
- ☐ 7. Inform pilot of the following phrase, to serve as a reminder of the correct control position when taxiing; **climb into a headwind, and dive away from a tailwind.**
- ☐ 8. Examine pilot to determine that a thorough understanding of taxiing and ground operations has been acquired.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Contact control tower and obtain an ATC clearance to taxi airplane.
- ☐ 3. Practice taxi movements and speed control with minimum use of brakes as directed.
- ☐ 4. Practice taxiing keeping flight controls in the proper position as airplane makes turns on the taxiways and ramp areas.
- ☐ 5. Pilot will adhere to signals and clearances, and follow the proper taxi route.

COMPLETION STANDARDS

- ☐ 1. Pilot can taxi aircraft on the ground with accuracy and safety, while giving full consideration to other aircraft and personnel on the taxiways and ramps.
- ☐ 2. Pilot is proficient in maintaining positive control of the airplane's direction, and speed of movement on the ground.
- ☐ 3. Pilot obtained ATC approval prior to taxi movement when control tower is operating.
- ☐ 4. Pilot has, by oral examination, explained safe taxi procedures.

REFERENCES

AC 61-21A	Flight Training Handbook (51)	A/FD	Airport/ Facility Directory
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	FAA P-8740-20	Preventing Accidents During Aircraft Ground Operations

DATE

Takeoff Check, Before

Preflight Procedures

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ CFI Explanation of Checklist Items .2
- ☐ CFI Demonstration of Checklist Items .5
- ☐ Pilot Application, Trial and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ Manufacturer's Recommended Checklist
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to the before takeoff check. This shall include the reasons for checking each item and how to detect malfunctions.
- ☐ 2. Positions the airplane properly considering other aircraft, wind and surface conditions.
- ☐ 3. Divides attention inside and outside the cockpit.
- ☐ 4. Ensures that engine temperature and pressure are suitable for run–up and takeoff.
- ☐ 5. Accomplishes the before takeoff check and confirms that the airplane is in safe operating condition.
- ☐ 6. Reviews takeoff performance airspeeds, takeoff distances, emergency procedures, and the departure procedure.
- ☐ 7. Assures no conflict with traffic prior to taxiing into takeoff position.
- ☐ 8. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Pilot vigilance must divide attention inside and outside the airplane
- ☐ 2. Position airplane and controls properly
- ☐ 3. Use of manufacturer's checklist for pre–takeoff check
- ☐ 4. Takeoff distance versus runway length
- ☐ 5. Fuel planning and management
- ☐ 6. ATC clearances
- ☐ 7. V–speeds, awareness and significance
- ☐ 8. Time checked and flight log noted
- ☐ 9. Wind speed and direction check
- ☐ 10. CIGARTIP (acronym) checklist
  - C Controls
  - I Instruments
  - G Gas
  - A Altimeter
  - R Runup
  - T Trim
  - I Interior
  - P Power (RPM or MP)

COMMON ERRORS

- ☐ 1. Airplane positioning, unsatisfactory
- ☐ 2. Checklist and/or item(s) bypassed
- ☐ 3. Flight controls improperly checked
- ☐ 4. Trim, failed to set for takeoff (V_Y)
- ☐ 5. Engine runup, approved marginal data
- ☐ 6. Airplane, operating condition in doubt
- ☐ 7. Attention in and out of cockpit inadequate
- ☐ 8. Traffic checks and awareness inadequate

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Advise pilot the "pre–takeoff check" is the systematic procedure for making final check of the engine, controls, systems, instruments, and radios prior to flight.
- ☐ 3. Demonstrate the safe positioning of airplane and correct procedures for completing the manufacturer's recommended pre–takeoff checklist and explain reasons for each item checked, proper settings, indications, frequency, etc.
- ☐ 4. Demonstrate obtaining ATC takeoff and departure clearance.
- ☐ 5. Check and note V–speeds and runway length available.
- ☐ 6. Discuss the final determination that airplane is in safe operating condition.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Practice the safe positioning of airplane and correct procedures for completing the AFM recommended pre–takeoff checklist, and check each item for proper settings, indications, frequency, etc.
- ☐ 3. Obtain ATC clearance, note V–speeds and runway length.
- ☐ 4. Pilot will make the go/no–go decision, by determining airplane's airworthiness.

COMPLETION STANDARDS

- ☐ 1. Pilot has positioned airplane in a safe manner while dividing attention inside and outside of the cockpit, and simultaneously avoiding the creation of any hazards.
- ☐ 2. Pilot has completed the pre–takeoff check and explained the reasons for checking each item.
- ☐ 3. Pilot has computed the performance speeds and runway length required, obtained an ATC clearance, and made the final determination that the airplane is in a safe and legal condition.

REFERENCES

AC 61-21A	Flight Training Handbook (56)	A/FD	Airport/ Facility Directory
AC 61-84B	Role of Preflight Preparation	FAA P-8740-7	The Safe Pilot's 12 Golden Rules
AFM	Approved Airplane Flight Manual	FAA P-8740-23	Planning Your Takeoff - Preflight

DATE

Radio Communications and ATC Light Signals

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Explanation of Checklist Items .2
- ☐ CFI Demonstration of Checklist Items .2
- ☐ Pilot Application, Trial and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Aircraft Radio Communication System
- ☐ Transponder With Mode C Capability
- ☐ Aeronautical Information Manual (AIM)
- ☐ Aeronautical Charts (Current)
- ☐ Blackboard or Graphics Pad
- ☐ Flight Training Handbook

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to radio communications and ATC light signals. This shall include radio failure procedures.
- ☐ 2. Selects appropriate frequencies.
- ☐ 3. Transmits using recommended phraseology.
- ☐ 4. Acknowledges radio communications and complies with instructions.
- ☐ 5. Uses prescribed procedures following radio communications failure.
- ☐ 6. Interprets and complies with ATC light signals.

ELEMENTS

- ☐ 1. Radio technique
- ☐ 2. Contact procedures
- ☐ 3. Aircraft call signs
- ☐ 4. Ground station call signs
- ☐ 5. Phonetic alphabet
- ☐ 6. ATC communications
- ☐ 7. Traffic control light signals
- ☐ 8. Emergency transmissions
- ☐ 9. Acknowledgement of assigned frequency
- ☐ 10. Chart communication boxes
- ☐ 11. Student pilot identification
- ☐ 12. Microphone and stuck mike
- ☐ 13. ATC transponder procedure, (CFR 91.215)
- ☐ 14. ELT requirements, (CFR 91.207)

COMMON ERRORS

- ☐ 1. Frequency selection was incorrect
- ☐ 2. Aircraft and position, failure to identify
- ☐ 3. Used obscure or improper phraseology
- ☐ 4. ATC light signals, failure to observe
- ☐ 5. Phonetic alphabet, pilot failed to utilize
- ☐ 6. Audio control console, pilot confused
- ☐ 7. Radio on but volume off or inaudible
- ☐ 8. Transponder, failed to activate

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Explain each of the elements, and exhibit the data in the reference material.
- ☐ 3. Demonstrate and simultaneously explain the correct procedures for establishing radio contact with ATC (ground and tower control) by selecting the proper frequencies from current aeronautical charts, and utilization of proper phraseology and compliance with instructions received. Additionally, show the proper and required use of ATC transponder with mode C.
- ☐ 4. Arrange a demonstration of traffic control light signals, to determine pilot compliance with instructions signaled.
- ☐ 5. Explain emergency procedures and squawking code 7600 with the ATC transponder.
- ☐ 6. Test pilot by oral examination to determine complete comprehension of the above.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Practice the correct procedures for establishing radio contact with ATC (ground and control towers) by selecting the proper frequencies from current aeronautical charts, and utilization of proper phraseology and compliance with instructions received.
- ☐ 3. Demonstrate understanding by completing an oral examination regarding lesson elements.

COMPLETION STANDARDS

- ☐ 1. Pilot has seen and correctly interpreted the tower light gun traffic signals.
- ☐ 2. Pilot has demonstrated by practical test and oral examination the ability to find, decipher and use the communication data on aeronautical charts accurately.
- ☐ 3. Pilot has used the appropriate communication procedures in radio contact with ATC (ground and tower) and did acknowledge and comply with the instruction, and at uncontrolled airports made the timely and correct radio transmissions.
- ☐ 4. Pilot has explained emergency and communications failure procedures.
- ☐ 5. Pilot has developed the habit of complying with CFR's regarding ATC transponder and altitude reporting equipment and use.

REFERENCES

AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	AC 61-21A	Flight Training Handbook (76)
AIM	Aeronautical Information Manual	CFR	Code of Federal Regulations

DATE

Traffic Patterns

Airport Operations

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Explanation of Pattern Procedures	.5
☐ Demonstration of Pattern Procedures	.2
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Airport/ Facility Directory
- ☐ Aeronautical Information Manual (AIM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Code of Federal Regulations, (CFR 91.113)

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to traffic patterns. This shall include procedures at controlled/uncontrolled airports, runway incursion and collision avoidance, wake turbulence avoidance, and wind shear.
- ☐ 2. Complies with traffic pattern procedures.
- ☐ 3. Maintains proper spacing from other traffic.
- ☐ 4. Establishes an appropriate distance from the runway, considering the possibility of an engine failure.
- ☐ 5. Corrects for wind drift to maintain the proper ground track.
- ☐ 6. Maintains orientation with the runway in use.
- ☐ 7. Maintains traffic pattern altitude, ±100 feet (30 meters), and the appropriate airspeed, ±10 knots.
- ☐ 8. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Safety precautions must be emphasized
- ☐ 2. Collision avoidance procedures
- ☐ 3. Wake turbulence avoidance and cautions
- ☐ 4. Wind direction, speed, and effects
- ☐ 5. Traffic separation techniques
- ☐ 6. Standard and non-standard procedures
- ☐ 7. Pilot responsibility, see and avoid aircraft
- ☐ 8. Prescribed speed, and altitude
- ☐ 9. ATC clearances compliance
- ☐ 10. Checklist, failure to use is irresponsible
- ☐ 11. Division of attention discipline
- ☐ 12. Right-of-way procedures
- ☐ 13. Wind drift correction angle (crab)
- ☐ 14. Traffic pattern indicators, and wind cone

COMMON ERRORS

- ☐ 1. Pattern entry at inappropriate altitude
- ☐ 2. Pattern exit, violated procedures
- ☐ 3. Right-of-way, misunderstood
- ☐ 4. Pattern ground track not maintained
- ☐ 5. Checklist and/or item(s) bypassed
- ☐ 6. Allocation of attention inadequate

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Explain each of the elements, and exhibit the data in the reference material.
- ☐ 3. Demonstrate the established traffic pattern procedures appropriate to the airport in use, including the basic legs and standard entry, while making accurate corrections for wind drift which will produce the expected traffic pattern and ground track. Demonstrate traffic astuteness and separation, while adhering to traffic pattern altitude, and airspeed standards.
- ☐ 4. Explain and demonstrate satisfying the pre-landing checklist items.
- ☐ 5. Test pilot by oral examination to determine complete comprehension of the above.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Practice the established traffic pattern procedures appropriate for the airport in use, including the standard entry and basic legs, while making corrections for wind drift, traffic separation, airspeed, altitude, and approach attitude. Also divide attention to permit completion of pre-landing checklist.
- ☐ 3. Demonstrate understanding by completing an oral examination on lesson elements.

COMPLETION STANDARDS

- ☐ 1. Pilot has employed appropriate vigilance and good operating techniques and procedures (as published) to enter and depart controlled and uncontrolled airports safely while avoiding aircraft, wind shear and wake turbulence.
- ☐ 2. Pilot has demonstrated the ability to fly the traffic pattern and make the corrections for wind drift, maintain the proper traffic separation while at the instructed airspeed and altitude, and retain runway orientation, and explained minimum visibility and ceiling requirements.
- ☐ 3. Pilot uses the pre-landing cockpit checklist and pilots the airplane within the objective criteria while using radio procedures in an airport traffic area, regardless if tower is operating or not.

REFERENCES

AC 61-21A	Flight Training Handbook (72)	AC 90-48C	Pilot's Role In Collision Avoidance
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	AC 90-66A	Traffic Patterns-Recommended Standard and Practices
AC 90-23E	Aircraft Wake Turbulence	AIM	Aeronautical Information Manual
AC 90-42	Traffic Advisory Practices At Airport W/O Control Towers	CFR	91.113

DATE

Airport and Runway Marking and Lighting

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Demonstration of Light Systems .2
- ☐ Present and Explain Elements .3
- ☐ Pilot Locate and Explain All Elements .5
- ☐ Postflight Critique and Discussion .1
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ Airport Diagram
- ☐ Airport/ Facility Directory
- ☐ Aeronautical Information Manual (AIM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Aeronautical Charts (Current)

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to airport and runway markings and lighting.

☐ 2. Identifies and interprets airport, runway and taxiway markings and lighting.

ELEMENTS

- ☐ 1. Airport (rotating) beacon, (day/night)
- ☐ 2. Runway lights, solid and split colored
- ☐ 3. Taxiway lights, blue colored
- ☐ 4. Obstruction lighting systems
- ☐ 5. Runway markings
- ☐ 6. Taxiway markings
- ☐ 7. Airport signs
- ☐ 8. Pilot controlled lighting systems
- ☐ 9. VASI light systems
- ☐ 10. Runway chevron patterns
- ☐ 11. Runway centerline arrowheads
- ☐ 12. Runway overrun or stopways
- ☐ 13. Holding bays, aprons and blastpad areas
- ☐ 14. Displaced threshold markings
- ☐ 15. Fixed distance markers
- ☐ 16. Touchdown zone
- ☐ 17. VFR runways versus IFR runways
- ☐ 18. Holding line, normal and CAT II
- ☐ 19. Wind sock, tetrahedron, and wind tee
- ☐ 20. Segmented circle and traffic indicators

COMMON ERRORS

- ☐ 1. Taxi direction signs to runways, confusing
- ☐ 2. Hold position lines, misinterpreted
- ☐ 3. Rotating beacon, day operation confusing
- ☐ 4. Disorientation, airport position (lost)
- ☐ 5. Runway turn offs, unable to locate
- ☐ 6. Centerlines, failure to follow correctly

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Explain each of the elements, and exhibit the data in the reference material.
- ☐ 3. Direct pilot to read the section "Runway and Taxiway Markings" in AC 61-21A.
- ☐ 4. Acquaint pilot with all of the above elements by visually presenting the various graphics, fixtures and lights, and pointing out that runway numbers are based on magnetic azimuth. In the interest of safety, insure that the pilot clearly recognizes and understands the areas that **are not available** for landing, takeoff, or taxiing.
- ☐ 5. Test pilot by oral examination to determine complete comprehension of the above. Additionally ensure that the pilot has acquired the ability to interpret airport, runway, taxiway marking, and lighting aids.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the section "Runway and Taxiway Markings" in AC 61-21A.
- ☐ 3. Pilot will follow directed practice in all succeeding taxiing and flights to interpret and obey, comply or adhere, to all airport, runway, taxiway marking, and lighting aids.
- ☐ 4. Demonstrate understanding by completing an oral examination on lesson elements.

COMPLETION STANDARDS

- ☐ 1. Pilot has used the reference material to determine the location of airport rotating beacons and confirm what other type of lighting systems are available to the pilot.
- ☐ 2. Pilot has demonstrated his familiarity and understanding with the various lighting systems and airport signs and marking by use and explanation.
- ☐ 3. Pilot understands that the operation of the airport rotating beacon during the hours of daylight often indicates that the ground visibility is less than 3 miles and/or the ceiling is less than 1,000 feet, and that ATC clearance (SVFR) is required for landing, takeoff, and flight in the traffic pattern except in class G airspace.

REFERENCES

AC 61-21A	Flight Training Handbook (83)	AC 150-5340	Standard Airport Markings
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	TERPS	Terminal Instrument Procedures
A/FD	Airport/ Facility Directory	IEOG	Runway Marking #26
AIM	Aeronautical Information Manual	IEOG	Runway and Displaced Threshold Lighting #33

DATE

Normal Takeoff and Climb

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Preflight Instruction On Objective	.2
☐ CFI Demonstration of Maneuver	.3
☐ Directed Pilot Application and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Critique and Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to a normal takeoff and climb.
- ☐ 2. Positions the flight controls for the existing wind conditions; sets the flaps as recommended.
- ☐ 3. Clears the area; taxis into the takeoff position and aligns the airplane on the runway centerline.
- ☐ 4. Advances the throttle smoothly to takeoff power.
- ☐ 5. Rotates at the recommended airspeed, lifts off, and accelerates to V_Y.
- ☐ 6. Establishes the pitch attitude for Vy and maintains V_Y, +10/–5 knots, during the climb.
- ☐ 7. Retracts the landing gear, if retractable, and flaps after a positive rate of climb is established.
- ☐ 8. Maintains takeoff power to a safe maneuvering altitude.
- ☐ 9. Maintains directional control and proper wind–drift correction throughout the takeoff and climb.
- ☐ 10. Complies with noise abatement procedures.
- ☐ 11. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Airspeed control and V–speeds, V_X, V_Y
- ☐ 2. Control of heading, ground and flight
- ☐ 3. Coordination of flight controls
- ☐ 4. Collision avoidance, traffic checks
- ☐ 5. Wake turbulence avoidance
- ☐ 6. Ground effect awareness
- ☐ 7. Attitude + power = performance
- ☐ 8. Left turning tendencies–
  - (a) torque reaction
  - (b) slipstream
  - (c) precession (gyroscopic)
  - (d) P–factor (descending blade)

COMMON ERRORS

- ☐ 1. Deficient airspeed control
- ☐ 2. Rudder application inadequate
- ☐ 3. Neglected to make traffic checks
- ☐ 4. Failure to control heading
- ☐ 5. Failure to direct vision properly
- ☐ 6. Accidentally applying brakes
- ☐ 7. Control apprehension and hesitation
- ☐ 8. Wing flaps, technique improper (unsafe)

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the chapter "Takeoffs and Departure Climbs" in AC 61-21A, Flight Training Handbook and resolve pilot's questions.
- ☐ 3. Demonstrate a normal takeoff and climb employing the manufacturer's recommended procedures and the objective V–speeds criteria, and retract landing gear after positive rate of climb is established; retract wing flaps after all obstacles have been cleared, maintain takeoff power until reaching an altitude of at least 500 to 700 feet AGL.
- ☐ 4. Direct and monitor pilot's practice of the normal takeoff and climb flight maneuver.
- ☐ 5. Conduct a postflight critique, discussion and review of procedures and flight techniques.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read and comprehend the chapter "Takeoffs and Departure Climbs" in AC 61-21A, Flight Training Handbook and resolve questions.
- ☐ 3. Practice the normal takeoff and climb flight maneuver as directed.
- ☐ 4. Participate in critique, discussion and review of procedures and flight techniques.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the acquisition of knowledge and the development of flight proficiency by successfully completing the objective, normal takeoff and climb, without the assistance of a flight instructor.

REFERENCES

AC 61-21A	Flight Training Handbook (86)	VEOG	Ground Effect #47
AC 61-23B	Pilot's Handbook Of Aeronautical Knowledge	VEOG	Flight In The Region of R/C In Relation To Takeoffs and Landings #57
POH	Pilot's Operating Handbook		
AFM	Approved Airplane Flight Manual	AC 90-23E	Aircraft Wake Turbulence

DATE

Crosswind Takeoff and Climb

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Preflight Instruction	.2
☐ CFI Demonstration of Maneuver	.3
☐ Directed Pilot Application and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Critique and Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to a crosswind takeoff and climb.
- ☐ 2. Positions the flight controls for the existing wind conditions; sets the flaps as recommended.
- ☐ 3. Clears the area; taxis into the takeoff position and aligns the airplane on the runway centerline.
- ☐ 4. Advances the throttle smoothly to takeoff power.
- ☐ 5. Rotates at the recommended airspeed, lifts off, and accelerates to V_Y.
- ☐ 6. Establishes the pitch attitude for V_Y and maintains V_Y, +10/–5 knots, during the climb.
- ☐ 7. Retracts the landing gear, if retractable, and flaps after a positive rate of climb is established.
- ☐ 8. Maintains takeoff power to a safe maneuvering altitude.
- ☐ 9. Maintains directional control and proper wind–drift correction throughout the takeoff and climb.
- ☐ 10. Complies with noise abatement procedures.
- ☐ 11. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Airspeed (V–speeds) control accurately
- ☐ 2. Control of heading, ground and flight
- ☐ 3. Crosswind component, control planning
- ☐ 4. Coordination of all flight controls
- ☐ 5. Collision avoidance, traffic checks
- ☐ 6. Ground effect awareness
- ☐ 7. Attitude + power = performance
- ☐ 8. Left turning tendencies–
  - (a) torque reaction
  - (b) slipstream
  - (c) precession (gyroscopic)
  - (d) P–factor (descending blade)

COMMON ERRORS

- ☐ 1. Airspeed (V–speeds), inaccurate control
- ☐ 2. Anticipation and planning inadequate
- ☐ 3. Poor control weathervaning tendency
- ☐ 4. Failure to direct vision properly
- ☐ 5. Drift correction inadequate
- ☐ 6. Ground track and runway alignment
- ☐ 7. Imposing side loads on landing gear
- ☐ 8. Rudder control inadequate
- ☐ 9. Control apprehension and hesitation
- ☐ 10. Wing flaps, technique improper (unsafe)

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the chapter "Crosswind Takeoffs and Climbs" in AC 61-21A.
- ☐ 3. Demonstrate a crosswind takeoff and climb employing the manufacturer's recommended procedures and the objective V–speeds criteria, and retract landing gear after positive rate of climb is established; retract wing flaps after all obstacles have been cleared, maintain takeoff power until reaching an altitude of at least 500 to 700 feet AGL.
- ☐ 4. Direct and monitor pilot's practice of the crosswind takeoff and climb maneuver.
- ☐ 5. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read and comprehend the chapter "Crosswind Takeoffs and Climbs" in AC 61-21A, Flight Training Handbook and resolve questions.
- ☐ 3. Practice the crosswind takeoff and climb flight maneuver as directed.
- ☐ 4. Participate in critique, discussion and review of procedures and flight techniques.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the acquisition of knowledge and the development of flight proficiency and skills by successfully completing the objective, crosswind takeoff and climb, without the assistance of a flight instructor.
- ☐ 2. Completes after–takeoff checklist.
- ☐ 3. Pilot understands coordinated flight, **"aileron and rudder, don't use one without the other"**.

REFERENCES

AC 61-21A	Flight Training Handbook (89)	AFM	Approved Airplane Flight Manual
POH	Pilot's Operating Handbook	FAA P-8740-23	Planning Your Takeoff

DATE

Normal Approach and Landing

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Explanation and Demonstration .2
- ☐ Directed Pilot Application and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Pilot's Operating Handbook (POH)
- ☐ Manufacturer's Recommended Checklist
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to a normal approach and landing.
- ☐ 2. Considers the wind conditions, landing surface and obstructions, and selects the most suitable touchdown point.
- ☐ 3. Establishes the recommended approach and landing configuration and airspeed, and adjusts pitch attitude and power as required.
- ☐ 4. Maintains a stabilized approach and the recommended approach airspeed, or in its absence, not more than 1.3 V_{SO}, +10/–5 knots, with gust factor applied.
- ☐ 5. Makes smooth, timely, and correct control application during the roundout and touchdown.
- ☐ 6. Touches down smoothly at the approximate stalling speed, at or within 400 feet (120 meters) beyond a specified point, with no drift, and with the airplane's longitudinal axis aligned with and over the runway centerline.
- ☐ 7. Maintains directional control throughout the approach and landing.
- ☐ 8. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Base leg pattern segment vs. runway
- ☐ 2. Final approach power and attitude
- ☐ 3. Roundout (flare) techniques
- ☐ 4. Touchdown and aligned with centerline
- ☐ 5. After-landing rollout and control methods
- ☐ 6. Normal landing configuration
- ☐ 7. Landing checklist use and compliance
- ☐ 8. Selected landing point vs. reference point
- ☐ 9. Planning final approach path
- ☐ 10. Flight control coordination
- ☐ 11. Judgment of altitude and distance
- ☐ 12. Airplane configuration and sequence
- ☐ 13. Accurately controlled descent angle
- ☐ 14. Accurately controlled airspeed
- ☐ 15. Control of heading, ground and flight
- ☐ 16. Manufacturer's recommendations

COMMON ERRORS

- ☐ 1. Final approach (AGL) low and unsafe
- ☐ 2. Final approach airspeed low and unsafe
- ☐ 3. Landing flare executed too high (AGL)
- ☐ 4. Landing roundout performed too late
- ☐ 5. Landing, excessive floating and airspeed
- ☐ 6. Ballooning during roundout
- ☐ 7. High bounce touchdown
- ☐ 8. Hard impact at landing touchdown
- ☐ 9. Drift or crab at touchdown
- ☐ 10. Attitude (pitch) control erratic
- ☐ 11. Airspeed and descent control inadequate
- ☐ 12. Flight control coordination difficulties
- ☐ 13. Heading control inaccurate and faulty
- ☐ 14. Approach high, dived in at high airspeed
- ☐ 15. Glide distance attempt unreasonable
- ☐ 16. Failure to execute a go-around

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Normal Approach and Landing" and "Faulty Approaches and Landings" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain normal landings and how to determine landing distance, approach speed, etc. Set configuration, power and trim, and in the proper sequence. Stabilize approach at recommended airspeed to roundout and touchdown. Coordinate flight control, and precise ground track. Stress the need for accurate directional control before and after landing, and proper use of brakes. Exit active runway before starting any checklist.
- ☐ 4. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the two sections about Approaches and Landings,and Faulty Approaches in AC 61-21A.
- ☐ 3. Complete supervised practice of normal approach and landing, as demonstrated.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the skill and understanding of the objective by performing the normal approach and landing, while operating within the prescribed flight parameters effectively, and explained the elements and cautions required.

REFERENCES

AC 60-14 Aviation Instructor's Handbook | AC 61-21A Flight Training Handbook (95)

DATE

Crosswind Approach and Landing

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Explanation and Demonstration .2
- ☐ Directed Pilot Application and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Pilot's Operating Handbook (POH)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to a crosswind approach and landing.
- ☐ 2. Considers the wind conditions, landing surface and obstructions, and selects the most suitable touchdown point.
- ☐ 3. Establishes the recommended approach and landing configuration and airspeed, and adjusts pitch attitude and power as required.
- ☐ 4. Maintains a stabilized approach and the recommended approach airspeed, or in its absence, not more than 1.3, V_{SO}, +10/–5 knots, with gust factor applied.
- ☐ 5. Makes smooth, timely, and correct control application during the roundout and touchdown.
- ☐ 6. Touches down smoothly at the approximate stalling speed, at or within 400 feet (120 meters) beyond a specified point, with no drift, and with the airplane's longitudinal axis aligned with and over the runway centerline.
- ☐ 7. Maintains crosswind correction and directional control throughout the approach and landing.
- ☐ 8. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Low wing approach method
- ☐ 2. Wind crab approach method
- ☐ 3. Judgment of drift correction angle
- ☐ 4. High degree of judgment and timing
- ☐ 5. Accurate airplane control
- ☐ 6. Longitudinal axis versus centerline
- ☐ 7. Weathervaning tendency
- ☐ 8. Runway directional control
- ☐ 9. Determine crosswind component
- ☐ 10. Rudder travel versus wind velocity
- ☐ 11. Flaps extension versus wind velocity
- ☐ 12. Flight control coordination
- ☐ 13. Aligning airplane and centerline
- ☐ 14. Accurate airspeed control
- ☐ 15. Minimum use of brakes
- ☐ 16. Touchdown control techniques
- ☐ 17. After landing roll out techniques
- ☐ 18. Manufacturer's recommendations

ASSOCIATED MANEUVERS

- ☐ 1. Maneuvering at critically slow airspeed
- ☐ 2. Stalls power off
- ☐ 3. Rectangular courses (pattern)
- ☐ 4. Descending turns
- ☐ 5. Soft field landings
- ☐ 6. Short field landings
- ☐ 7. Emergency landings
- ☐ 8. Go around – rejected landings

COMMON ERRORS

- ☐ 1. Sideloads imposed at touchdown
- ☐ 2. Crosswind component exceeded
- ☐ 3. Drifting excessively without correction
- ☐ 4. Ground looping tendency
- ☐ 5. Flight control coordination inadequate
- ☐ 6. Failure to execute a go-around

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Crosswind Approach and Landing" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain the crosswind landings techniques. The airplane wing is lowered into the wind to avoid wind drift. Airplane must contact the runway without drifting to either side. Both the ground track and longitudinal axis of the airplane must be aligned with the runway when the airplane contacts the ground; otherwise, severe side loads will be imposed on the landing gear and tires resulting in damage. A good rule of thumb to remember is: **"control the drift with aileron and the heading with rudder."**
- ☐ 4. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Crosswind Approach and Landing", in AC 61-21A.
- ☐ 3. Complete supervised practice of crosswind approach and landing, as demonstrated.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the skill and understanding of the objective by performing the crosswind approach and landing, while operating within the prescribed flight parameters effectively, and explained the elements and cautions required.

REFERENCES

AC 60-14 Aviation Instructor's Handbook | AC 61-21A Flight Training Handbook (106)

DATE

Soft-Field Takeoff and Climb

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Preflight Instruction .2
- ☐ CFI Demonstration of Maneuver .3
- ☐ Directed Pilot Application and Practice 1.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to a soft-field takeoff and climb.
- ☐ 2. Positions the flight controls for the existing wind conditions and so as to maximize lift as quickly as possible; sets the flaps as recommended.
- ☐ 3. Clears the area; taxies onto the takeoff surface at a speed consistent with safety and aligns the airplane without stopping while advancing the throttle smoothly to takeoff power.
- ☐ 4. Establishes and maintains the pitch attitude that will transfer the weight of the airplane from the wheels to the wings as rapidly as possible.
- ☐ 5. Lifts off and remains in ground effect while accelerating to Vy.
- ☐ 6. Establishes the pitch attitude for Vy and maintains Vy, +10/–5 knots, during the climb.
- ☐ 7. Retracts the landing gear, if retractable, and flaps after a positive rate of climb is established.
- ☐ 8. Maintains takeoff power to a safe maneuvering altitude.
- ☐ 9. Maintains directional control and proper wind-drift correction throughout the takeoff and climb.
- ☐ 10. Complies with noise abatement procedures.
- ☐ 11. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Runway surface conditions
- ☐ 2. Wind conditions and calculations
- ☐ 3. Runway alignment with no stopping
- ☐ 4. Flight controls, initial position and settings
- ☐ 5. Directional control during acceleration
- ☐ 6. Crosswind control application techniques

COMMON ERRORS

- ☐ 1. Wing flaps, recommended use ignored
- ☐ 2. Airplane halted on runway prior to takeoff
- ☐ 3. Power, improper application technique
- ☐ 4. Throttle procedure (hand-on) ignored
- ☐ 5. Directional ground control is precarious
- ☐ 6. Brakes, unexpectedly utilized
- ☐ 7. Attitude, improper, unsafe pitch at lift-off
- ☐ 8. Torque and P-factor forces ignored
- ☐ 9. Drifting uncontrolled during initial climb
- ☐ 10. Touchdown inadvertently after lift-off

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the chapter "Soft Field Takeoffs and Climbs" in AC 61-21A.
- ☐ 3. Demonstrate a soft field takeoff and climb by transfer of weight from the landing gear to the wings as rapidly as possible during takeoff ground acceleration. Lift-off at the lowest possible airspeed and continue accelerating while in ground effect, employing the manufacturer's recommended procedures and the objective V-speeds criteria, and retract landing gear after positive rate of climb is established. Retract wing flaps after all obstacles have been cleared, maintain takeoff power until reaching a safe maneuvering altitude, 500 to 700 feet AGL.
- ☐ 4. Direct and monitor pilot's practice of the soft field takeoff and climb maneuver.
- ☐ 5. Conduct a postflight critique, discussion and review of procedures and flight techniques.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read and comprehend the chapter "Soft Field Takeoffs and Climbs" in AC 61-21A, Flight Training Handbook and resolve questions.
- ☐ 3. Practice the soft field takeoff and climb flight maneuver as directed.
- ☐ 4. Participate in critique, discussion and review of procedures and flight techniques.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the acquisition of knowledge and the development of flight proficiency and skills by successfully completing the objective, soft field takeoff and climb, without the assistance of a flight instructor.

REFERENCES

AC 61-21A	Flight Training Handbook (92)	AFM	Approved Airplane Flight Manual
POH	Pilot's Operating Handbook	FAA P-8740-23	Planning Your Takeoff

DATE

Soft-Field Approach and Landing

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Explanation and Demonstration .2
- ☐ Directed Pilot Application and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

• All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Pilot's Operating Handbook (POH)
- ☐ Manufacturer's Recommended Checklist
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to a soft-field approach and landing.
- ☐ 2. Considers the wind conditions, landing surface and obstructions, and selects the most suitable touchdown point.
- ☐ 3. Establishes the recommended approach and landing configuration and airspeed, and adjusts pitch attitude and power as required.
- ☐ 4. Maintains a stabilized approach and the recommended approach airspeed, or in its absence not more than 1.3 V_{SO}, +10/–5 knots, with gust factor applied.
- ☐ 5. Makes smooth, timely, and correct control application during the roundout and touchdown.
- ☐ 6. Touches down smoothly with no drift, and with the airplane's longitudinal axis aligned with and over the runway centerline.
- ☐ 7. Maintains the correct position of the flight controls and sufficient speed to taxi on the soft surface.
- ☐ 8. Maintains crosswind correction and directional control throughout the approach and landing.
- ☐ 9. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Airspeed maintained as recommended
- ☐ 2. Heading control maintained consistently
- ☐ 3. Flap usage with extreme caution
- ☐ 4. Power application and management
- ☐ 5. Trim control and continual management
- ☐ 6. Unique touchdown techniques
- ☐ 7. Caution and delayed touchdown
- ☐ 8. Nosewheel versus tailwheel technique
- ☐ 9. Shallow approach
- ☐ 10. Landing checklist, AFM recommended

COMMON ERRORS

- ☐ 1. Anticipation and planning inadequate
- ☐ 2. Airspeed was improper for maneuver
- ☐ 3. Landing performance data disregarded
- ☐ 4. Throttle closed too abruptly or quickly
- ☐ 5. Flight control application uncoordinated
- ☐ 6. Descent rate (VSI) excessive
- ☐ 7. Landing approach not stabilized
- ☐ 8. Wind effect was not considered
- ☐ 9. Nose wheel lowered prematurely
- ☐ 10. Brakes improperly used, (not required)
- ☐ 11. Throttle procedure (hand-on) ignored
- ☐ 12. Flare and/or touchdown uncontrolled
- ☐ 13. Trim system, failure to use properly
- ☐ 14. Wing flaps, technique improper (unsafe)
- ☐ 15. Taxiing procedures (soft field), ignored
- ☐ 16. Go-around situation not recognized

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Soft Field Approach and Landing" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain and demonstrate the techniques used to perform a soft field landing, using a stabilized approach, with touchdown at the slowest possible airspeed, and the airplane in a nose high pitch attitude. A slight addition of power may be applied to help **keep the nosewheel off the ground until it can no longer aerodynamically be held off the field,** and the flaps are promptly retracted (see AFM). The utilization of any brakes must be at the absolute minimum. In tailwheel type airplanes, the touchdown should be a three point landing.
- ☐ 4. Advise pilot this is the primary maneuver to develop sink rate control and conquer hard landings.
- ☐ 5. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Soft Field Approach and Landing" in AC 61-21A.
- ☐ 3. Complete supervised practice of soft field approach and landing, using manufacturer's recommended procedures and checklist, as demonstrated by instructor.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the skill and understanding of the objective by performing the approach and soft field landing, while operating within the prescribed flight parameters effectively, and explained the elements and cautions required.

REFERENCES

AC 61-21A	Flight Training Handbook (112)	AFM	Approved Airplane Flight Manual
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	POH	Pilot's Operating Handbook

DATE

Short-Field Takeoff and Climb

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Preflight Instruction	.2
☐ CFI Demonstration of Maneuver	.3
☐ Directed Pilot Application and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to a short-field takeoff and climb.
- ☐ 2. Positions the flight controls for the existing wind conditions; sets the flaps as recommended.
- ☐ 3. Clears the area; taxies into the takeoff position so as to allow maximum utilization of available takeoff area and aligns the airplane on the runway centerline.
- ☐ 4. Advances the throttle smoothly to takeoff power.
- ☐ 5. Rotates at the recommended airspeed, lifts off and accelerates to the recommended obstacle clearance airspeed of V_X.
- ☐ 6. Establishes the pitch attitude for the recommended obstacle clearance airspeed, or V_X, and maintains that airspeed, +10/–5 knots, until the obstacle is cleared, or until the airplane is 50 feet (20 meters) above the surface.
- ☐ 7. After clearing the obstacle, accelerates to V_Y, establishes the pitch attitude for V_Y, and maintains V_Y, +10/–5 knots, during the climb.
- ☐ 8. Retracts the landing gear, if retractable, and flaps after a positive rate of climb is established.
- ☐ 9. Maintains takeoff power to a safe maneuvering altitude.
- ☐ 10. Maintains directional control and proper wind-drift correction throughout the takeoff and climb.
- ☐ 11. Complies with noise abatement procedures.
- ☐ 12. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Flight control utilization and coordination
- ☐ 2. Pitch attitude control emphasized
- ☐ 3. Rudder force coordination emphasized
- ☐ 4. Torque and P-factor considerations
- ☐ 5. V_X and V_Y aerodynamic effectiveness
- ☐ 6. Ground effect and artificial lift

COMMON ERRORS

- ☐ 1. Anticipation and planning inadequate
- ☐ 2. Lift-off or rotation was premature
- ☐ 3. Rudder control, insufficient and erratic
- ☐ 4. Power, attitude, airspeed, control faulty
- ☐ 5. Best angle-of-climb V_Y exceeded
- ☐ 6. Best rate-of-climb V_Y exceeded
- ☐ 7. Runway, failed to use entire length
- ☐ 8. Wing flaps, technique improper (unsafe)

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the chapter "Short Field Takeoffs and Climbs" in AC 61-21A.
- ☐ 3. Explain and demonstrate this maximum performance takeoff, employing the manufacturer's recommended procedures and the objective V-speeds criteria. Takeoff will start at the very beginning of the runway threshold with flaps extended as recommended. Takeoff power is applied promptly while releasing brakes. The airplane must be accelerated as rapidly as possible with the full weight on the main wheels until reaching lift-off speed V_X. Retract landing gear after positive rate of climb is established, then retract wing flaps after all obstacles have been cleared, then V_Y. Maintain full power until reaching an altitude of 500 to 700 feet AGL.
- ☐ 4. Direct and monitor pilot's practice of the short field takeoff and climb maneuver.
- ☐ 5. Conduct a postflight critique, discussion and review of procedures and flight techniques.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read and comprehend the chapter "Short Field Takeoffs and Climbs" in AC 61-21A, Flight Training Handbook and resolve questions.
- ☐ 3. Practice the short field takeoff and climb flight maneuver as directed.
- ☐ 4. Participate in critique, discussion and review of procedures and flight techniques.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the acquisition of knowledge and the development of flight proficiency and skills by successfully completing the objective, short field takeoff and climb, without the assistance of a flight instructor.
- ☐ 2. Completed manufacturer's recommended after-takeoff checklist in a timely manner.

REFERENCES

AC 61-21A	Flight Training Handbook (91)	AFM	Approved Airplane Flight Manual
POH	Pilot's Operating Handbook	FAA P-8740-23	Planning Your Takeoff

DATE

Short–Field Approach and Landing

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Explanation and Demonstration	.2
☐ Directed Pilot Application and Practice	.7
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Pilot's Operating Handbook (POH)
- ☐ Manufacturer's Recommended Checklist
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

1. ☐ Exhibits knowledge of the elements related to a short–field approach and landing.
2. ☐ Considers the wind conditions, landing surface and obstructions, and selects the most suitable touchdown point.
3. ☐ Establishes the recommended approach and landing configuration and airspeed, and adjusts pitch attitude and power as required.
4. ☐ Maintains a stabilized approach and the recommended approach airspeed, or in its absence not more than 1.3 V_{SO}, +10/–5 knots, with gust factor applied.
5. ☐ Makes smooth, timely, and correct control application during the roundout and touchdown.
6. ☐ Touches down smoothly at the approximate stalling speed, at or within 200 feet (60 meters) beyond a specified point, with no side drift, and with the airplane's longitudinal axis aligned with and over the runway centerline.
7. ☐ Applies brakes, as necessary, to stop in the shortest distance consistent with safety.
8. ☐ Maintains crosswind correction and directional control throughout the approach and landing.
9. ☐ Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Airspeed maintained as recommended
- ☐ 2. Rate of descent, precisely maintained
- ☐ 3. Flaps, correct stage extension position
- ☐ 4. Landing checklist, AFM recommended
- ☐ 5. Pitch, power, bank and trim control
- ☐ 6. Manufacturer's recommended procedure

COMMON ERRORS

- ☐ 1. Landing area, exceeded available runway
- ☐ 2. Airspeed allowed to become excessive
- ☐ 3. Landing configuration established late
- ☐ 4. Power control and monitoring inadequate
- ☐ 5. Landing approach not stabilized
- ☐ 6. Wing flaps, technique improper (unsafe)
- ☐ 7. Trim system, failure to use properly
- ☐ 8. Checklist, manufacturer's ignored
- ☐ 9. Throttle procedure (hand–on) ignored
- ☐ 10. Hard impact or bounced at touchdown
- ☐ 11. Brakes, apply firmly and conscientiously
- ☐ 12. Go–around situation not recognized

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Short Field Approach and Landing" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain the selection of a suitable touchdown point, and the short field stabilized power–on approach and landing. Use a moderately steep, constant rate of descent, and airspeed (at 1.3 V_{SO} or less). The pitch attitude may be adjusted as necessary to hold the desired rate, or angle of descent. Never cut power until past all obstacles, then adjust power to maintain desired airspeed. Touchdown should occur at or within 200 feet beyond the selected point, and at minimum controllable airspeed on the main wheels, with the airplane in a high pitch attitude. Immediately upon landing, cut power, retract flaps, apply the brakes, and stop the airplane in the shortest possible distance consistent with safety. This is one of the most critical of the maximum performance operations; use caution, and do not hesitate to execute a go–around.
- ☐ 4. Supervise pilot's practice of short field approach and landing techniques.
- ☐ 5. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Short Field Approach and Landing" in AC 61-21A.
- ☐ 3. Complete supervised practice of short field approach and landing, as demonstrated.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the skill and understanding of the objective by performing the short field approach and landing, while operating within the prescribed flight parameters effectively, and explained the elements and cautions imperative for a safe operation.

REFERENCES

AC 60-14	Aviation Instructor's Handbook
AC 61-16A	Flight Instructor's Handbook
AC 61-21A	Flight Training Handbook (110)
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
POH	Pilot's Operating Handbook

DATE

Slips To Landing (Forward)

Takeoffs, Landings, and Go-Arounds

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Explanation and Demonstration .2
- ☐ Directed Pilot Application and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Pilot's Operating Handbook (POH)
- ☐ Manufacturer's Recommended Checklist
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to a forward slip to a landing.
- ☐ 2. Considers the wind conditions, landing surface and obstructions, and selects the most suitable touchdown point.
- ☐ 3. Establishes the slipping attitude at the point from which a landing can be made using the recommended approach and landing configuration and airspeed; adjusts pitch attitude and power as required.
- ☐ 4. Maintains a ground track aligned with the runway centerline and an airspeed which results in minimum float during the roundout.
- ☐ 5. Makes smooth, timely, and correct control application during the recovery from the slip, the roundout, and the touchdown.
- ☐ 6. Touches down smoothly at the approximate stalling speed, at or within 400 feet (120 meters) beyond a specified point, with no side drift, and with the airplane's longitudinal axis aligned with and over the runway centerline.
- ☐ 7. Maintains crosswind correction and directional control throughout the approach and landing.
- ☐ 8. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Flight control coordination
- ☐ 2. Airspeed control
- ☐ 3. Heading versus ground track
- ☐ 4. Simultaneously apply controls
- ☐ 5. More effective into the wind
- ☐ 6. Power off – engine at idle
- ☐ 7. Touchdown alignment
- ☐ 8. Manufacturer's recommendations

COMMON ERRORS

- ☐ 1. Flight control coordination inadequate
- ☐ 2. Airspeed prescribed was not maintained
- ☐ 3. Skidding on recovery
- ☐ 4. Slip recovery execution hazardously late
- ☐ 5. Imposing severe sideloads
- ☐ 6. Crosswind component disregarded
- ☐ 7. Landing approach configuration faulty
- ☐ 8. Slip attitude not maintained properly
- ☐ 9. Throttle procedure (hand-on) ignored
- ☐ 10. Slip transition to touchdown improper
- ☐ 11. Directional control after landing critical
- ☐ 12. Brakes inappropriately applied intensely

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Slips" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain a forward slip, reduce power for glide, maintaining the airplane's direction of motion, straight and aligned with runway, lower the wing on the side in the direction which the slip is to be made by use of the ailerons. Simultaneously, the airplane's nose must be yawed in the opposite direction by applying opposite rudder so that airplane's longitudinal axis is at an angle to its original flightpath. Recovery is made by leveling the wings and simultaneously releasing the rudder pressure, touchdown at stalling speed without drift and aligned with centerline, and applying all of the objective standards.
- ☐ 4. Supervise pilot's practice of forward slips and landings procedures, and techniques.
- ☐ 5. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Slips" in AC 61-21A.
- ☐ 3. Complete supervised practice of forward slips and landings, as demonstrated.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the primary purpose of forward slips is to dissipate altitude without increasing the airplane's speed, and has performed the slip procedure while operating within the prescribed objective flight parameters with skillful flight proficiency.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 61-16A	Flight Instructor's Handbook	POH	Pilot's Operating Handbook
AC 61-21A	Flight Training Handbook (102)		

DATE

Go-Around
Rejected (Balked) (Aborted) Landing

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Demonstration and Explanation	.2
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Pilot's Operating Handbook (POH)
- ☐ Manufacturer's Recommended Checklist
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to a go-around.
- ☐ 2. Makes a timely decision to discontinue the approach to landing.
- ☐ 3. Applies takeoff power immediately and transitions to the climb pitch attitude for V_Y, +10/–5 knots.
- ☐ 4. Retracts the flaps to the approach setting, if applicable.
- ☐ 5. Retracts the landing gear, if retractable, after a positive rate of climb is established.
- ☐ 6. Maintains takeoff power to a safe maneuvering altitude, then sets power and transitions to the airspeed appropriate for the traffic pattern.
- ☐ 7. Maintains directional control and proper wind-drift correction throughout the climb.
- ☐ 8. Complies with noise abatement procedures, as appropriate.
- ☐ 9. Flies the appropriate traffic pattern.
- ☐ 10. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Before-landing checklist completion
- ☐ 2. Recognize go-around situations
- ☐ 3. Go-around procedure and techniques
- ☐ 4. Constant, safe attitude maintained
- ☐ 5. Airspeed control
- ☐ 6. Flap management (incrementally)
- ☐ 7. Attitude (pitch) control
- ☐ 8. Power management
- ☐ 9. Retract landing gear as counseled
- ☐ 10. Control in proper sequence
- ☐ 11. Manufacturer's recommendations
- ☐ 12. Torque and P-factor consideration

COMMON ERRORS

- ☐ 1. Excessive nose high pitch
- ☐ 2. Failure to use takeoff power
- ☐ 3. Go-around situation not recognized
- ☐ 4. Power application prolonged
- ☐ 5. Decision hesitation and procrastination
- ☐ 6. Pitch attitude control erratic
- ☐ 7. Torque and P-factor forces ignored
- ☐ 8. Trim technique improper
- ☐ 9. V_Y was not maintained as AFM prescribed
- ☐ 10. Wing flaps retracted prematurely

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Go-Arounds (Rejected Landings)" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain a go-around (rejected landing). A critical go-around will usually be one started very close to the ground. A safe go-around can be accomplished if an early decision is made, a plan is followed, and the procedure is performed properly. The pilot should never wait until the last moment! When the decision is made to go around, takeoff power must be applied immediately and the airplane's pitch attitude changed so as to stop the descent, then landing flaps may be **partially** retracted or placed in the takeoff position, **as recommended by the manufacturer!** Caution must be used. When power is applied forward elevator pressure must be applied to hold the nose in a safe climbing attitude; right rudder pressure must be increased to counteract torque, and P-factor, and to keep the nose straight. Never retract the landing gear until an initial trim is accomplished and you have a positive rate of climb. Then accelerate to the best rate of climb speed (V_Y). Remind pilot that a go-around should be the first opinion, not last option.
- ☐ 4. Supervise pilot's practice of go-around (rejected landing) techniques.
- ☐ 5. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Go-Arounds (Rejected Landings)" in AC 61-21A.
- ☐ 3. Complete supervised practice of go-around (rejected landing), as demonstrated.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the airplane climb capabilities in the landing configuration, and has consistently performed the go-around procedure while operating within prescribed flight parameters with skillful flight proficiency, and practiced prudent safety precautions.

REFERENCES

AC 61-21A Flight Training Handbook (103) | POH Pilot's Operating Handbook

DATE

Steep Turns

Performance Maneuvers

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Demonstration and Explanation	.2
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to steep turns.
- ☐ 2. Selects an altitude that will allow the task to be performed no lower than 1,500 feet (460 meters) AGL.
- ☐ 3. Establishes V_A or the recommended entry speed for the airplane.
- ☐ 4. Rolls into a coordinated 360° turn; maintains a 45° bank, ±5°, and rolls out on the entry heading, ±10°.
- ☐ 5. Performs the task in the opposite direction, as specified by the examiner.
- ☐ 6. Divides attention between airplane control and orientation.
- ☐ 7. Maintains the entry altitude, ±100 feet (30 meters), and airspeed, ±10 knots.

ELEMENTS

- ☐ 1. Design maneuvering speed V_A
- ☐ 2. Angle of bank vs. load factors and stall
- ☐ 3. Minimum safe altitude awareness
- ☐ 4. Stall recognition and avoidance
- ☐ 5. Altitude control versus angle of bank
- ☐ 6. Flight control utilization and coordination
- ☐ 7. Attention, proper division and allocation
- ☐ 8. Scanning techniques VR and IR
- ☐ 9. Forces acting on the airplane in a turn
- ☐ 10. Slip and skid indications
- ☐ 11. Angle of bank indications
- ☐ 12. Rudder force coordination emphasized

ASSOCIATED MANEUVERS

- ☐ 1. Critical flight attitudes
- ☐ 2. Flight at critically slow airspeed
- ☐ 3. Stall recognition and recovery
- ☐ 4. Maximum performance maneuvers

COMMON ERRORS

- ☐ 1. Inadequate bank and altitude control
- ☐ 2. Stalled inadvertently, scanning inadequate
- ☐ 3. Throttle procedure (hand–on) ignored
- ☐ 4. Aileron, elevator, and rudder, poor control
- ☐ 5. Torque and P–factor forces disregarded
- ☐ 6. Disorientation vertigo and dizziness

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Instruct the pilot that; **shallow turns** have an angle of bank that is less than 20° degrees, and that the inherent stability of the airplane is acting to level the wings unless some control force is used to maintain the bank. **Medium turns** have a degree of bank of 20° to 45°, and the airplane tends to hold a constant bank without control force on the ailerons. **Steep turns** have a degree of bank of more than 45°, and the overbanking tendency of the airplane overcomes stability, and the bank tends to increase unless pressure is applied to the aileron controls to prevent it. Control rule: **"aileron and rudder, never use one without the other"**.
- ☐ 3. Demonstrate and simultaneously explain that the pilot must be aware that an increase in bank increases the load factor which increases the stalling speed at a **significant** rate. Establish V_A, and initiate a level roll into a 45° bank while increasing back pressure on the elevator to increase the AOA (angle of attack), and due to the increased load factor more power must be added to hold entry altitude. If pilot begins to climb, the bank should be increased, and if the airplane starts to descend, the bank should be decreased; both actions require coordinated use of ailerons and rudder. Roll rate of the turn(s) must be consistent.
- ☐ 4. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the sections "Turns", "Turning Flight", and "Steep Power Turns" in AC 61-21A.
- ☐ 3. Practice and experience the G–force, and required back pressure on the elevator to overcome the load factor and the added power needed to hold altitude, in the 45° steep turns.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated and explained an awareness of increased load factors, stall speeds, and the added power needed to maintain a constant altitude turn at 40° to 50° angle of bank in coordinated flight, and rolled out on the assigned heading, while maintaining flight orientation throughout the performance of constant altitude turns, and adhering to above criteria.

REFERENCES

AC 61-21A Flight Training Handbook (158) | AC 61-16A Flight Instructor's Handbook

DATE

Rectangular Course

Ground Reference Maneuvers

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Explanation and Demonstration .2
- ☐ Directed Pilot Application and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aeronautical Information Manual (AIM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to a rectangular course.
- ☐ 2. Determines the wind direction and speed.
- ☐ 3. Selects the ground reference area with an emergency landing area within gliding distance.
- ☐ 4. Plans the maneuver so as to enter at traffic pattern altitude, at an appropriate distance from the selected reference area, 45° to the downwind leg, with the first circuit to the left.
- ☐ 5. Applies adequate wind-drift correction during straight-and-turning flight to maintain a constant ground track around the rectangular reference area.
- ☐ 6 Divides attention between airplane control and the ground track and maintains coordinated flight.
- ☐ 7. Exits at the point of entry at the same altitude and airspeed at which the maneuver was started, and reverses course as directed by the examiner.
- ☐ 8. Maintains altitude, ±100 feet (30 meters); maintains airspeed, ±10 knots.

ELEMENTS

- ☐ 1. Planning turns
- ☐ 2. Crabbing for wind drift
- ☐ 3. Flight control coordination
- ☐ 4. Airspeed constant
- ☐ 5. Pilot able to view reference field
- ☐ 6. Ground track versus magnetic heading
- ☐ 7. Traffic pattern components
- ☐ 8. Traffic pattern altitude, constant
- ☐ 9. Pattern (area) entry and departure
- ☐ 10. Equidistant on all sides
- ☐ 11. Anticipate wind drift
- ☐ 12. Division of attention

COMMON ERRORS

- ☐ 1. Failure to maintain desired ground track
- ☐ 2. Turn roll out on wrong headings
- ☐ 3. Poor altitude control
- ☐ 4. Flight control coordination improper
- ☐ 5. Disorientation (position)
- ☐ 6. Exceeding 45° angle of bank
- ☐ 7. Losing sight of reference field
- ☐ 8. Drift correction angle applied incorrectly

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Rectangular Course" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain flying a rectangular course (pattern) by following a definite ground track at a constant pattern altitude. Select a rectangular field where the long sides are one mile or a little less. Flight path should be so that pilot can observe the field boundaries. Pilot must divide attention so as to maintain the flight path, observe ground reference points, look for other traffic and control the airplane while performing the rectangular pattern. Pilot must plan ahead and use different angles of bank in order to roll out of the turns at the proper distance from the selected field, while making proper wind drift corrections and flying around each corner as performing one-fourth of a constant-radius turn.
- ☐ 4. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Rectangular Course" in AC 61-21A.
- ☐ 3. Practice maintaining the ground track with wind crabbing, planning turns, division of attention, flight control, traffic awareness, and flying rectangular course.

COMPLETION STANDARDS

- ☐ 1. Pilot demonstrated and explained the awareness of wind drift correction to hold a straight ground track, the similarity of this maneuver and a traffic pattern, has selected reference field, determined the correct altitude, and competent flight control, and with division of attention, avoided all other traffic.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 61-16A	Flight Instructor's Handbook	AC 61-27C	Instrument Flying Handbook
AC 61-21A	Flight Training Handbook (134)	AC 90-48C	Pilots' Role In Collision Avoidance

DATE

S-Turns

Ground Reference Maneuvers

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Instructor Demonstration	.2
☐ Directed Pilot Application and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to S-turns.
- ☐ 2. Determines the wind direction and speed.
- ☐ 3. Selects the reference line with an emergency landing area within gliding distance.
- ☐ 4. Plans the maneuver so as to enter at 600 to 1,000 feet (180 to 300 meters) AGL, perpendicular to the selected reference line, downwind, with the first series of turns to the left.
- ☐ 5. Applies adequate wind-drift correction to track a constant radius half-circle on each side of the selected reference line.
- ☐ 6. Divides attention between airplane control and the ground track and maintains coordinated flight.
- ☐ 7. Reverses course, as directed by the examiner, and exits at the point of entry at the same altitude and airspeed at which the maneuver was started.
- ☐ 8. Maintains altitude, ±100 feet (30 meters); maintains airspeed, ±10 knots.

ELEMENTS

- ☐ 1. Maneuvering by ground references
- ☐ 2. Planning and anticipation
- ☐ 3. Wind drift correction angle (crab)
- ☐ 4. Coordination of flight controls
- ☐ 5. Altitude control
- ☐ 6. Dividing attention, cockpit and ground
- ☐ 7. Constant radius ground track
- ☐ 8. Roll rate and angle of bank
- ☐ 9. Selection of ground reference line
- ☐ 10. Collision avoidance
- ☐ 11. Traffic pattern altitude
- ☐ 12. Constantly changing angle of bank
- ☐ 13. Visualize 180° ground track
- ☐ 14. Consecutive and opposite 180° turns

COMMON ERRORS

- ☐ 1. Disorientation (position)
- ☐ 2. Poor planning and anticipation
- ☐ 3. Flight control coordination inadequate
- ☐ 4. Poor altitude and airspeed control
- ☐ 5. Faulty crab angle for wind drift
- ☐ 6. Slipping and/or skidding
- ☐ 7. Excessive ground track radius
- ☐ 8. Improper angle of bank

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "S-Turns Across a Road" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain flying S-turns; select a road that is perpendicular to the wind. Fly two 180°, constant radius turns of equal size on opposite sides of the road, using appropriate pattern altitude. The direction of turns should change as the airplane crosses the road. Pilot should enter the maneuver on a downwind heading, and as the airplane crosses the road, immediately roll into a bank. This will be the steepest bank used throughout the procedure. Wings should be level as airplane comes back across the road after the first 180° turn, and a turn in the opposite direction should be immediately started. As in constant radius turns the airplane must be crabbed to maintain desired ground track.
- ☐ 4. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "S-Turns Across a Road" in AC 61-21A.
- ☐ 3. Practice the S-turns to develop the ability to compensate for wind drift during turns; orient the flight path with ground references, and divide the attention between ground reference points and the cockpit instruments.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated and explained the S-turns across a road, and was able to maneuver the airplane in semicircles of equal radii, and at a constant altitude and airspeed across a road perpendicular to the wind, while continually changing the angle of bank and correcting for wind drift accurately, and maintaining coordination and orientation.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AC 61-21A	Flight Training Handbook (136)
AC 61-16A	Flight Instructor's Handbook	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge

DATE

Turns Around A Point

Ground Reference Maneuvers

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Instructor Demonstration	.2
☐ Directed Pilot Application and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to turns around a point.
- ☐ 2. Determines the wind direction and speed.
- ☐ 3. Selects the reference point with an emergency landing area within gliding distance.
- ☐ 4. Plans the maneuver so as to enter at 600 to 1,000 feet (180 to 300 meters) AGL, at an appropriate distance from the reference point, with the airplane headed downwind and the first turn to the left.
- ☐ 5. Applies adequate wind-drift correction to track a constant radius circle around the selected reference point with a bank of approximately 45° at the steepest point in the turn.
- ☐ 6. Divides attention between airplane control and the ground track and maintains coordinated flight.
- ☐ 7. Completes two turns, exits at the point of entry at the same altitude and airspeed at which the maneuver was started, and reverses course as directed by examiner.
- ☐ 8. Maintains altitude, ±100 feet (30 meters); maintains airspeed, ±10 knots.

ELEMENTS

- ☐ 1. Constant radius turns
- ☐ 2. Constant altitude turns
- ☐ 3. Select prominent reference point
- ☐ 4. Enter on downwind heading
- ☐ 5. Visual contact with reference point
- ☐ 6. Maximum angle of bank 45°
- ☐ 7. Anticipation and planning
- ☐ 8. Varying bank to control the radius
- ☐ 9. Coordination of flight controls
- ☐ 10. Control of airspeed and altitude
- ☐ 11. Wind drift correction angle (crab)
- ☐ 12. Altitude above 600 feet AGL
- ☐ 13. Maneuvering by ground references
- ☐ 14. Collision avoidance and traffic vigilance

COMMON ERRORS

- ☐ 1. Failure to hold a constant radius
- ☐ 2. Poor altitude control
- ☐ 3. Flight control coordination inadequate
- ☐ 4. Faulty crab angle for wind drift
- ☐ 5. Rudder use and control inadequate
- ☐ 6. Power control and monitoring inadequate

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Turns Around a Point" in AC 61-21A.
- ☐ 3. Instruct pilot that this training, as in other ground reference maneuvers, is to help the pilot develop the ability to subconsciously control the airplane while dividing attention between the cockpit and ground references, and watching for other air traffic in the vicinity.
- ☐ 4. Demonstrate and simultaneously explain flying turns around a point, at approximately 600' AGL. Maintain a constant radius by varying bank to compensate for wind drift, so as to circle at a uniform distance around the preselected point on the ground. The point selected as a reference should be prominent, and easily distinguished. Additionally, pilot must maintain a constant altitude, orientation, and roll out on the initial heading after two 360° turns. Enter downwind 90° opposite selected point and at a distance equal to the radius of the desired turn. Use elevator to control AOA. Make 720° turns both right and left. Turns must have a 45° angle of bank at the steepest point.
- ☐ 5. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Turns Around a Point" in AC 61-21A.
- ☐ 3. Practice the maneuver, turns around a point, by flying the airplane in two or more complete circles of uniform radii or distance from a prominent ground reference point, using a maximum angle of bank of approximately 45° while maintaining a constant altitude.

COMPLETION STANDARDS

- ☐ 1. Pilot has selected a prominent reference point acceptably clear of people, buildings, and animals, and performed the turns around a point competently, and explained the factors and principles of wind drift correction, and varying the angle of bank and amount of crab required to maintain a constant radius turn, while operating within the prescribed flight parameters.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AC 61-21A	Flight Training Handbook (137)
AC 61-16A	Flight Instructor's Handbook	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge

DATE

Pilotage (Ground Features)

Navigation

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Explanation and Demonstration	.5
☐ Pilot Application, Trial and Practice	2.0
☐ Postflight Critique and Discussion	.3
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aeronautical Charts (Current)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ Flight Computer and Plotter
- ☐ Flight Plan Forms and Flight Logs

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to pilotage.
- ☐ 2. Follows the preplanned course solely by reference to landmarks.
- ☐ 3. Identifies landmarks by relating surface features to chart symbols.
- ☐ 4. Navigates by means of precomputed headings, groundspeeds, and elapsed time.
- ☐ 5. Corrects for and records the differences between preflight fuel, groundspeed, and heading calculations and those determined en route.
- ☐ 6. Verifies the airplane's position within 3 nautical miles of the flight-planned route at all times.
- ☐ 7. Arrives at the en route checkpoints and destination within 5 minutes of the ETA.
- ☐ 8. Maintains the appropriate altitude, ±200 feet (60 meters) and established heading, ±15°.
- ☐ 9. Completes all appropriate checklists.

ELEMENTS

- ☐ 1. Chart symbols and interpretation
- ☐ 2. Terrain features, location and recognition
- ☐ 3. Landmarks, make conspicuous selection
- ☐ 4. Navigation primarily by use of landmarks
- ☐ 5. Fly a pre-planned ground track
- ☐ 6. Time, speed and distance calculations
- ☐ 7. Estimated time of arrival (ETA)
- ☐ 8. Fuel (GPH) vs. legal reserve, (CFR 91.151)
- ☐ 9. Pilot's planning sheet completion
- ☐ 10. Visual flight log preparation and utilization
- ☐ 11. Airport destination, required data checked
- ☐ 12. Flight progress record maintained current

COMMON ERRORS

- ☐ 1. Disorientation, especially right from left
- ☐ 2. Failure to consider pattern of landmarks
- ☐ 3. Misinterpretation of chart symbols
- ☐ 4. Checkpoints, failure to fix on the course
- ☐ 5. Inappropriate selection of checkpoints
- ☐ 6. Flight progress, failed to maintain record
- ☐ 7. Neglected fuel flow management
- ☐ 8. Failure to maintain flight prerequisites
- ☐ 9. HI, failure to reset frequently to compass
- ☐ 10. Position, precise location undetermined
- ☐ 11. Cockpit management inadequate
- ☐ 12. Collision avoidance, poor traffic scanning
- ☐ 13. Flight plan opening and/or closing ignored
- ☐ 14. Landing upon return unsatisfactory

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the chapter "Pilotage" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain and acquaint pilot with the pilotage techniques and procedures used in planning a cross country flight, with the selection of appropriate checkpoints, and completing a flight log, while using each of the above elements in the process.
- ☐ 4. Demonstrate and simultaneously explain the pilotage method of airplane navigation, which is accomplished solely by means of flying from one visible landmark to another, (prominent checkpoints), while employing all the necessary procedures of cross country pilotage navigation which would assure accurate compliance with lesson criteria.
- ☐ 5. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the chapter "Pilotage" in AC 61-21A.
- ☐ 3. Make a cross country flight using the flight log prepared with the pilotage navigation techniques and procedures. Observe checkpoints, note arrival times and make corrections. Record the differences between preflight calculations for fuel, groundspeed, and heading and those determined en route, while frequently updating the ETA.

COMPLETION STANDARDS

- ☐ 1. Pilot has accurately completed a cross country flight while explaining the techniques and procedures of navigating solely by means of flying from one visible landmark to another (pilotage), also adhering to all of the objective criteria with skilful flight proficiency.
- ☐ 2. Pilot consistently employed and followed the climb, cruise, and descent checklist.

REFERENCES

AC 61-21A	Flight Training Handbook (168)	VFR-CUG	Visual Flight Rules Chart User's Guide (NOAA)
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge (194)	VEOG	Cross Country Flight, Preflight Planning #06

DATE

Dead Reckoning (Computation)

Navigation

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Demonstration of Methodology	.3
☐ Pilot Application, Trial and Practice	2.0
☐ Postflight Critique and Discussion	.5
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Aeronautical Charts (Current)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ Flight Computer and Plotter
- ☐ Flight Plan Forms and Flight Logs

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to dead reckoning.
- ☐ 2. Follows the preplanned course solely by reference to landmarks.
- ☐ 3. Identifies landmarks by relating surface features to chart symbols.
- ☐ 4. Navigates by means of precomputed headings, groundspeeds, and elapsed time.
- ☐ 5. Corrects for and records the differences between preflight fuel, groundspeed, and heading calculations and those determined en route.
- ☐ 6. Verifies the airplane's position within 3 nautical miles of the flight–planned route at all times.
- ☐ 7. Arrives at the en route checkpoints and destination within 5 minutes of the ETA.
- ☐ 8. Maintains the appropriate altitude, ±200 feet (60 meters) and established heading, ±15°.
- ☐ 9. Completes all appropriate checklists.

ELEMENTS

- ☐ 1. True course chart line designated
- ☐ 2. Wind correction angle (WCA)
- ☐ 3. True heading determined
- ☐ 4. Ground track predicted versus actual
- ☐ 5. Magnetic variation (±) isogonic line
- ☐ 6. Magnetic heading, predicted vs. actual
- ☐ 7. Compass deviation card accuracy
- ☐ 8. Compass heading and heading indicator
- ☐ 9. Trip distance, in nautical miles
- ☐ 10. Airspeed, IAS versus TAS
- ☐ 11. Ground speed anticipated versus actual
- ☐ 12. Estimated time of arrival (ETA)
- ☐ 13. Fuel (GPH) vs. legal reserve, CFR 91.151
- ☐ 14. Pilot's planning sheet completion
- ☐ 15. Visual flight log preparation and updating
- ☐ 16. Clock functioning and set to correct time
- ☐ 17. Compass and inherent idiosyncrasies
- ☐ 18. Line of position (LOP) from VOR or ADF
- ☐ 19. Checkpoints, preferably prominent ones
- ☐ 20. Time, speed and distance calculations
- ☐ 21. Airport destination, required data checked
- ☐ 22. Weather briefing, and en route updating

COMMON ERRORS

- ☐ 1. Calculations incomplete or inaccurate
- ☐ 2. ETA, failure to monitor and update
- ☐ 3. Nautical versus statute mile confusion
- ☐ 4. Flight progress, failed to maintain record
- ☐ 5. HI, failure to reset frequently to compass
- ☐ 6. Flight plan opening and/or closing ignored
- ☐ 7. Cockpit management inadequate
- ☐ 8. Wind direction and speed not verified
- ☐ 9. Checklist and/or item(s) bypassed
- ☐ 10. Position, precise location undetermined

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the chapter "Dead Reckoning" in AC 61-21A.
- ☐ 3. Explain and demonstrate the planning of a flight, and completing a flight log, while using each of the above elements as it is employed in the process.
- ☐ 4. Demonstrate the dead reckoning method of airplane navigation, which is accomplished solely by means of computations based on airspeed, course, heading, wind direction and speed, groundspeed, and elapsed time.
- ☐ 5. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the chapter "Dead Reckoning" in AC 61-21A.
- ☐ 3. Make a cross country flight using the flight log prepared with the dead reckoning navigation techniques and procedures. Observe checkpoints, note arrival times and make corrections. Record the differences between preflight calculations for fuel, groundspeed, and heading and those determined en route, while frequently updating the ETA.

COMPLETION STANDARDS

- ☐ 1. Pilot has accurately completed a cross country flight, using and explaining dead reckoning techniques and procedures while meeting all of the objective criteria.
- ☐ 2. Pilot used and followed the climb, cruise, and descent checklist.

REFERENCES

AC 61-21A	Flight Training Handbook (170)	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
FAA P-8740-22	Dead Reckoning Navigation	A/FD	Airport/ Facility Directory

DATE

Navigation Systems and Radar Services

Navigation

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Explanation and Demonstration	.5
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.5
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aeronautical Charts (Current)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ Flight Computer and Plotter
- ☐ Flight Plan Forms and Flight Logs

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to navigation systems and radar services.
- ☐ 2. Selects and identifies the appropriate navigation system/facility.
- ☐ 3. Locates the airplane's position using radials, bearings, or coordinates, as appropriate.
- ☐ 4. Intercepts and tracks a given radial or bearing, if appropriate.
- ☐ 5. Recognizes and describes the indication of station passage, if appropriate.
- ☐ 6. Recognizes signal loss and takes appropriate actions.
- ☐ 7. Uses proper communication procedures when utilizing ATC radar services.
- ☐ 8. Maintains the appropriate altitude, ±200 feet (60 m).

ELEMENTS

- ☐ 1. Communication radio tuning and testing
- ☐ 2. Navigational radio tuning and testing
- ☐ 3. VOR signals for tracking
- ☐ 4. VOR determining position fixes
- ☐ 5. VOR warning alarm flag
- ☐ 6. VOR's CDI interpretation
- ☐ 7. VOR TO – FROM indications
- ☐ 8. VOR receiver accuracy check
- ☐ 9. VOR sensitivity, deflection 10° of center
- ☐ 10. ADF's bearing pointer interpretation
- ☐ 11. ADF indications for tracking
- ☐ 12. ADF determining position fixes
- ☐ 13. ADF failure and test procedures
- ☐ 14. DME accuracy 3% or .5 mile
- ☐ 15. Transponder check and code policy
- ☐ 16. RNAV/LORAN navigation systems
- ☐ 17. GPS navigation systems
- ☐ 18. Radio signals and limitations
- ☐ 19. Radio facilities and aeronautical charts
- ☐ 20. Manufacturer's operating instructions
- ☐ 21. Airport destination, required data checked
- ☐ 22. Avionics monitoring essential for safety

COMMON ERRORS

- ☐ 1. Station tuning and identification faulty
- ☐ 2. Misinterpretation of navigational signals
- ☐ 3. Plotting and determination of fixes faulty
- ☐ 4. Radials versus bearings confusion
- ☐ 5. Audio control panel is confusing to pilot
- ☐ 6. Cockpit management inadequate
- ☐ 7. Airport destination facilities not checked
- ☐ 8. NOTAM's not checked, stations OTS
- ☐ 9. HI, failure to reset frequently to compass
- ☐ 10. Checklist and/or item(s) bypassed

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Radio Aids to Navigation" in AC 61-21A.
- ☐ 3. Explain and demonstrate each of the elements as it is employed in the flight.
- ☐ 4. Present the flight planning process and make a demonstration flight by selecting and identifying radio facilities, finding position, intercept and track radials and bearings, locate position by cross radials or bearings, show indications of station passage, and lost radio signal.
- ☐ 5. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the section "Radio Aids to Navigation" in AC 61-21A.
- ☐ 3. Complete a flight log and flight plan, using radio navigation facilities to specify course.
- ☐ 4. Make a cross country flight by selecting and identifying radio facilities, finding position, intercept and track radials and bearings, locate position by cross radials or bearings, show indications of station passage, and lost radio signal.

COMPLETION STANDARDS

- ☐ 1. Pilot has accurately completed a cross country flight, using and explaining radio navigation techniques and procedures while meeting all of the objective criteria.
- ☐ 2. Pilot has a thorough understanding of the fact that the use of radio navigation in "conjunction" with pilotage and dead reckoning, is necessary for effective, safe cross-country flying.

REFERENCES

AC 61-21A	Flight Training Handbook (188)	IEOG	CDI Interpretation #07
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	IEOG	VOR Receiver Accuracy Check #22
FAA P-8740-18	Preflighting Your Avionics-Checklist	VEOG	VOR (Series 1) #15
CFR	91.411, 91.413	VEOG	VOR (Series 2) #16

DATE

Diversion To Alternate Airport

Navigation

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Explanation and Demonstration	.5
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.5
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Aeronautical Charts (Current)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ Flight Computer and Plotter
- ☐ Flight Plan Forms and Flight Logs

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to diversion.
- ☐ 2. Selects an appropriate alternate airport and route.
- ☐ 3. Diverts promptly toward the alternate airport.
- ☐ 4. Makes an accurate estimate of heading, groundspeed, arrival time, and fuel consumption to the alternate airport.
- ☐ 5. Maintains the appropriate altitude, ±200 feet (60 meters) and established heading, ±15°.

ELEMENTS

- ☐ 1. Position, maintain precise awareness
- ☐ 2. Cockpit organization and management
- ☐ 3. Chart orientation, accurate and immediate
- ☐ 4. Division of attention, correct and safe
- ☐ 5. Emergency evaluation, quick and proper
- ☐ 6. Flight continuation, prompt determination
- ☐ 7. Alternate airport selection appropriate
- ☐ 8. Divert promptly, on a tentative heading
- ☐ 9. Pilotage navigation
- ☐ 10. Dead reckoning navigation
- ☐ 11. Radio aids navigation
- ☐ 12. Select appropriate frequencies
- ☐ 13. Compute reasonably accurate course
- ☐ 14. Determine distance, time, fuel, and ETA

COMMON ERRORS

- ☐ 1. Position, precise location unknown
- ☐ 2. Landmarks, failure to monitor and check
- ☐ 3. Reciprocal of radial, failed to compute
- ☐ 4. Facility frequency selection incorrect
- ☐ 5. Diversion situation not recognized
- ☐ 6. Uncertainty and indecision
- ☐ 7. Alternative action not considered
- ☐ 8. Disorientation (position)
- ☐ 9. Flight progress, failed to maintain record
- ☐ 10. Facility selection incorrect, not identified
- ☐ 11. Miscalculation of course navigation data
- ☐ 12. HI, failure to reset frequently to compass

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Diversion to an Alternate" in AC 61-21A.
- ☐ 3. Advise pilot that the essential key to the successful completion of this task is an accurate and perpetual awareness of present position, and the ability to use rule–of–thumb data.
- ☐ 4. Explain and demonstrate the situations that will cause the pilot to promptly select an alternate airport on the chart and turn immediately toward that destination.
- ☐ 5. Demonstrate the techniques and skills used to confirm the course, and compute time, speed, distance, and fuel, while en route, to the alternate destination, by employing pilotage, dead reckoning, and or radio navigation methods.
- ☐ 6. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the section "Diversion to an Alternate" in AC 61-21A.
- ☐ 3. Practice dividing attention between solving the problem of a new destination selection and flying the airplane, while using the above elements in locating and selecting an alternate airport on the chart. Flight plan, file, open, and close punctually.
- ☐ 4. Practice making reasonable estimate of heading, groundspeed, arrival time, and fuel consumption to the alternate airport while en route.

COMPLETION STANDARDS

- ☐ 1. Pilot understands before changing course that he must consider the relative distance to all suitable alternate airport destinations, for the given circumstance.
- ☐ 2. Read the section "Diversion to an Alternate" in AC 61-21A.
- ☐ 3. Pilot has demonstrated the ability to select an appropriate landing site, determine the magnetic course, and turn immediately to the new course. Then later, the wind correction, actual distance, and estimated time and fuel required was computed accurately while the airplane proceeded toward the alternate at assigned altitude.

REFERENCES

AC 61-21A	Flight Training Handbook (179)	AC 61-84B	Role of Preflight Preparation
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	VFR-CUG	Visual Flight Rules Chart User's Guide (NOAA)

DATE

Lost Procedures

Navigation

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Explanation and Demonstration	.5
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.5
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ Aircraft Radio Nav.–Comm. Systems
- ☐ Aeronautical Charts (Current)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ Flight Computer and Plotter
- ☐ Flight Plan Forms and Flight Logs

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to lost procedures.
- ☐ 2. Selects the best course of action when given a lost situation.
- ☐ 3. Maintains the original or an appropriate heading and climbs, if necessary.
- ☐ 4. Identifies the nearest concentration of prominent landmarks.
- ☐ 5. Uses navigation systems/facilities and/or contacts an ATC facility for assistance, as appropriate.
- ☐ 6. Plans a precautionary landing if deteriorating weather and/or fuel exhaustion is imminent.

ELEMENTS

- ☐ 1. Destination, flexibility to change quickly
- ☐ 2. DF (VHF/UHF Direction Finder) stations
- ☐ 3. Confusion and apprehension, act now
- ☐ 4. Radar services, requesting assistance
- ☐ 5. Avoid hesitation and procrastination
- ☐ 6. Selection of safe landing area
- ☐ 7. Line of position (LOP) from VOR or ADF
- ☐ 8. The four "C's"
  - Climb
  - Communicate
  - Confess
  - Comply

COMMON ERRORS

- ☐ 1. WCA, misapplied to desired ground track
- ☐ 2. Nautical versus statute mile confusion
- ☐ 3. Clock time, failure to monitor frequently
- ☐ 4. Ground speed, estimate was erroneous
- ☐ 5. Aeronautical chart misinterpretation
- ☐ 6. Panic and not thinking effectively
- ☐ 7. Flight progress, failure to monitor
- ☐ 8. Hesitation and procrastination, no action
- ☐ 9. Disorientation, position confusion
- ☐ 10. Engine quit due to fuel exhaustion
- ☐ 11. Sectional vs. WAC, wrong scale used
- ☐ 12. Wind correction angle miscalculated

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Losing Track of Position" in AC 61-21A.
- ☐ 3. Demonstrate that the airplane is going to be within a "reasonable" distance of the planned checkpoint and ETA, and should maintain the original or an appropriate heading. Identify landmarks, and climb, if necessary.
- ☐ 4. Explain and demonstrate the "circle of error" (area of probable location), and that the most likely position will be downwind from the desired course.
- ☐ 5. Demonstrate climbing and using available radio navigation aids or contacting an appropriate facility for assistance using 121.5 or any active frequency.
- ☐ 6. Demonstrate the procedures for making a field selection for a precautionary landing, and determination of wind direction. Don't run out of fuel, or daylight, or VFR weather.
- ☐ 7. Advise calm and cautious thinking when selecting the best course of action when lost. Pilot statement, "I am not sure of my exact position, equals I am lost!" Take action now.
- ☐ 8. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the chapter "Losing Track of Position" in AC 61-21A.
- ☐ 3. Practice the above objective with all of the elements on every flight.

COMPLETION STANDARDS

- ☐ 1. Pilot has not gotten lost, but has demonstrated the habit of frequently, and positively identifying present position.
- ☐ 2. Pilot has contacted control towers and ATC and has requested and received practice radar steers successfully.
- ☐ 3. Pilot has demonstrated the ability to select appropriate and safe precautionary landing site and the judgment process to determine the best course of action.

REFERENCES

AC 61-21A	Flight Training Handbook (172)	AC 61-84B	Role of Preflight Preparation
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	VEOG	Emergency or Lost Procedures #19

DATE

Maneuvering During Slow Flight

Slow Flight and Stalls

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Demonstration and Explanation .2
- ☐ Pilot Application, Trial and Practice 1.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits 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 (460 meters) AGL or the recommended altitude, whichever is higher.
- ☐ 3. Stabilizes the airspeed at 1.2 V_{S1}, +10/–5 knots.
- ☐ 4. Accomplishes coordinated straight-and-level flight and level turns, at bank angles and in configurations, as specified by the examiner.
- ☐ 5. Accomplishes coordinated climbs and descents, straight and turning, at bank angles and in configurations as specified by the examiner.
- ☐ 6. Divides attention between airplane control and orientation.
- ☐ 7. Maintains the specified altitude, ±100 feet (30 meters); the specified heading, ±10°, and the specified airspeed, +10/–5 knots.
- ☐ 8. Maintains the specified angle of bank, not to exceed 30° in level flight, +0/–10°; maintains the specified angle of bank, not to exceed 20° in climbing or descending flight, +0/–10°, rolls out on the specified heading ±10°, and levels off from climbs and descents within ±100 feet (30 meters).

ELEMENTS

- ☐ 1. Determination of required speeds
- ☐ 2. Configurations vs. airspeed and attitude
- ☐ 3. Control effectiveness versus airspeed
- ☐ 4. Stall recognition and avoidance
- ☐ 5. Control of heading, attitude, and altitude
- ☐ 6. Flight control utilization and coordination
- ☐ 7. Minimum versus critical airspeed
- ☐ 8. Trim control and management
- ☐ 9. Load factors and stalling speeds
- ☐ 10. Cruise flight, reestablishment procedure
- ☐ 11. Manufacturer's recommended procedure
- ☐ 12. Area traffic surveillance, continually

ASSOCIATED MANEUVERS

- ☐ 1. Takeoffs and landings
- ☐ 2. Climbs and descents
- ☐ 3. Stall recognition and recovery
- ☐ 4. Maximum performance maneuvers

COMMON ERRORS

- ☐ 1. Poor heading and altitude control
- ☐ 2. Stalled inadvertently, unsafe technique
- ☐ 3. Power control and monitoring inadequate
- ☐ 4. Airspeed, failure to maintain as specified
- ☐ 5. Pilot grip on flight controls fatiguing
- ☐ 6. Angle of attack awareness insufficient
- ☐ 7. Airspeed, failure to maintain as specified
- ☐ 8. Entry technique and criteria improper
- ☐ 9. Flight control rough and/or uncoordinated
- ☐ 10. Trim technique ignored or improper
- ☐ 11. Throttle procedure (hand-on) ignored
- ☐ 12. Control apprehension and hesitation

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read section "Maneuvering at Minimum Controllable Airspeed" in AC 61-21A.
- ☐ 3. Explain that "flight at minimum (critical) controllable airspeed" means a speed at which any further increase in angle of attack or load factor, or reduction in power will cause an immediate stall. At this speed (1.2 V_{S1}, ± 5 knots), the **pilot should use both visual and instrument references.**
- ☐ 4. Demonstrate and simultaneously explain the relationship of configuration, weight, center of gravity, maneuvering loads, angle of bank, and power to flight characteristics and degree of controllability of the airplane at its critically slow airspeed, and relationship of this maneuver to critical flight situations, such as go-arounds, while employing the objective flight criteria.
- ☐ 5. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the above assigned section in AC 61-21A, Flight Training Handbook.
- ☐ 3. Practice flight at critically slow airspeed to determine the characteristic control response in order to avoid stalls at slower airspeeds which are an element of takeoffs, climbs, and landings.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the skill and understanding of slow flight, by maneuvering airplane and performing turns, climbs, and descents while operating within the objective parameters effectively.

REFERENCES

AC 61-21A Flight Training Handbook (149) | AC 61-16A Flight Instructor's Handbook

DATE

Stalls Power–Off

Slow Flight and Stalls

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Demonstration and Explanation	.2
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to power–off stalls. This shall include an understanding of the aerodynamics of a stall which occurs as a result of uncoordinated flight. Emphasis shall be placed upon recognition of and recovery from a power–off stall.
- ☐ 2. Selects an entry altitude that will allow the task to be completed no lower than 1,500 feet (460 meters) AGL or the recommended altitude, whichever is higher.
- ☐ 3. Establishes a stabilized approach in the approach or landing configuration, as specified by the examiner.
- ☐ 4. Transitions smoothly from the approach or landing attitude to the pitch attitude that will induce a stall.
- ☐ 5. Maintains a specified heading, ±10°, if in straight flight; maintains a specified angle of bank not to exceed 30°, +0/–10°, if in turning flight while inducing the stall.
- ☐ 6. Recognizes and announces the first aerodynamic indications of the oncoming stall, i.e., buffeting or decay of control effectiveness.
- ☐ 7. Recovers promptly after a stall occurs by simultaneously decreasing the pitch attitude, applying power, and leveling the wings to return to a straight–and–level flight attitude with a minimum loss of altitude appropriate for the airplane.
- ☐ 8. Retracts the flaps to the recommended setting; retracts the landing gear, if retractable, after a positive rate of climb is established; accelerates to V_Y before the final flap retraction; returns to the altitude, heading and airspeed specified by the examiner.

ELEMENTS

- ☐ 1. Approach procedure configuration
- ☐ 2. Aerodynamic factors and effects
- ☐ 3. Flight control coordination
- ☐ 4. Performance (reaction) timing
- ☐ 5. Control responsiveness judgment
- ☐ 6. Power management, decisive but smooth
- ☐ 7. Safe altitude and clear traffic area
- ☐ 8. Stall warning system indicators
- ☐ 9. Ground proximity, perpetual awareness
- ☐ 10. Airspeed awareness
- ☐ 11. Manufacturer's recommended procedure
- ☐ 12. Collision avoidance procedures

COMMON ERRORS

- ☐ 1. Stall recognition, inadequate or late
- ☐ 2. Poor flight control coordination
- ☐ 3. Heading, disregarded assignment
- ☐ 4. Anticipation and planning inadequate
- ☐ 5. Excessive airspeed and altitude loss
- ☐ 6. Secondary stall permitted, (unsatisfactory)
- ☐ 7. Aileron, elevator, and rudder, poor control
- ☐ 8. Panicked, not thinking conscientiously

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Advise pilot that airplane can stall at any airspeed, attitude, or any power setting.
- ☐ 3. Direct pilot to read the section "Recognition of Stalls" in AC 61-21A.
- ☐ 4. Demonstrate and simultaneously explain a full power–off stall maneuver, by employing the above entry criteria to induce the stall, and explain the stall recognition cues. At full stall apply the above recovery methods immediately with smooth diligent control application.
- ☐ 5. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read and study the section "Recognition of Stalls" in AC 61-21A.
- ☐ 3. Practice stall recognition entry, and recovery skills with smooth control technique.

COMPLETION STANDARDS

- ☐ 1. Pilot used proper and effective scanning and turning techniques to clear the area before performing unusual attitudes such as power–off stalls.
- ☐ 2. Pilot has described and performed the full power–off stall maneuver, as prescribed by the objective, and at the time of actual stall it was recognized and an immediate recovery was initiated by decreasing the angle of attack (AOA), leveling the wings, and adjusting the power, as necessary, to regain normal flight attitude. Thereafter wing flaps and landing gear were retracted, and a climb established.

REFERENCES

AC 61-21A	Flight Training Handbook (147)	AC 61-67B	Stall and Spin Awareness Training
VEOG	Factors Affecting Stall Speed	AC 61-23B	Pilot's Handbook Of Aeronautical Knowledge

DATE

Stalls Power–On

Slow Flight and Stalls

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Explanation and Demonstration	.2
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to power–on stalls. This shall include an understanding of the aerodynamics of a stall which occurs as a result of uncoordinated flight. Emphasis shall be placed upon recognition of and recovery from a power–on stall.
- ☐ 2. Selects an entry altitude that will allow the task to be completed no lower than 1,500 feet (460 meters) AGL or the recommended altitude, whichever is higher.
- ☐ 3. Establishes the takeoff or departure configuration, airspeed, and power as specified by the examiner.
- ☐ 4. Transitions smoothly from the takeoff or departure attitude to the pitch attitude that will induce a stall.
- ☐ 5. Maintains a specified heading, ±10°, if in straight flight; maintains a specified angle of bank not to exceed 20 °, +0/–10° if in turning flight, while inducing the stall.
- ☐ 6. Recognizes and announces the first aerodynamic indications of the oncoming stall, i.e., buffeting or decay of control effectiveness.
- ☐ 7. Recovers promptly after a stall occurs by simultaneously decreasing the pitch attitude, applying power as appropriate, and leveling the wings to return to a straight–and–level flight attitude with a minimum loss of altitude appropriate for the airplane.
- ☐ 8. Retracts the flaps to the recommended setting; retracts the landing gear, if retractable, after a positive rate of climb is established; accelerates to V_Y before the final flap retraction; returns to the altitude, heading, and airspeed specified by the examiner.

ELEMENTS

- ☐ 1. Departure procedure configuration
- ☐ 2. Aerodynamic factors and effects
- ☐ 3. Flight control coordination
- ☐ 4. Performance (reaction) timing
- ☐ 5. Control responsiveness judgment
- ☐ 6. Power management, decisive but smooth
- ☐ 7. Safe altitude and clear traffic area
- ☐ 8. Stall warning system indicators
- ☐ 9. Ground proximity, perpetual awareness
- ☐ 10. Airspeed awareness
- ☐ 11. Manufacturer's recommended procedure
- ☐ 12. Collision avoidance procedures

COMMON ERRORS

- ☐ 1. Stall recognition, inadequate or late
- ☐ 2. Poor flight control coordination
- ☐ 3. Heading, disregarded assignment
- ☐ 4. Anticipation and planning inadequate
- ☐ 5. Excessive airspeed and altitude loss
- ☐ 6. Secondary stall permitted, (unsatisfactory)
- ☐ 7. Aileron, elevator, and rudder, poor control
- ☐ 8. Panicked, not thinking conscientiously

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required performance criteria.
- ☐ 2. Advise pilot that airplane can stall at any airspeed, attitude, or any power setting.
- ☐ 3. Demonstrate and simultaneously explain a full power–on stall maneuver, by employing the above entry criteria to induce the stall and explain the stall recognition cues. At full stall apply the above recovery methods immediately with smooth diligent control application.
- ☐ 4. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Practice stall recognition entry, and recovery skills with smooth control technique and avoid secondary stall or excessive airspeed, or excessive altitude loss.

COMPLETION STANDARDS

- ☐ 1. Pilot used proper and effective scanning and turning techniques to clear the area before performing unusual attitudes.
- ☐ 2. Pilot has described and performed the full power–on stall maneuver, as prescribed by the objective, and at the time of actual stall it was recognized and an immediate recovery was initiated by decreasing the angle of attack (AOA), leveling the wings, and adjusting the power, as necessary, to regain normal flight attitude. Thereafter wing flaps and landing gear were retracted, and normal flight resumed.

REFERENCES

AC 61-21A	Flight Training Handbook (147)	AC 61-67B	Stall and Spin Awareness Training
VEOG	Factors Affecting Stall Speed	AC 61-23B	Pilot's Handbook Of Aeronautical Knowledge

DATE _____

Spin Awareness

Slow Flight and Stalls

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT _____

SCHEDULE

- ☐ Discuss Spin Awareness Lesson Objective 1.0
- ☐ CFI Demonstration of Probable Spin Situations .5
- ☐ Pilot Practice of Spin Recovery Procedures .8
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant exhibits knowledge of the elements related to spin awareness by explaining:

- ☐ 1. Flight situations where unintentional spins may occur.
- ☐ 2. The technique used to recognize and recover from unintentional spins.
- ☐ 3. The recommended spin recovery procedure for the airplane used for the practical test.

ELEMENTS

- ☐ 1. Angle of attack vs. IAS, and angle of bank
- ☐ 2. Distraction of pilot primary cause of stalls
- ☐ 3. Stall recognition and prompt proper action
- ☐ 4. V-speeds and their variance and relevance
- ☐ 5. Systematic VFR scan vs. stall/spin avoidance
- ☐ 6. Recognition of flight, conducive to stall/spin
- ☐ 7. Spin recovery procedures, see AFM or POH
- ☐ 8. Weight, balance, and C.G. location
- ☐ 9. Critical flight phases (low, slow, and turning)
- ☐ 10. Spin types, incipient, developed, and flat
- ☐ 11. Control application vs. appropriate release
- ☐ 12. Manufacturer's recommended training SOP
- ☐ 13. Airplane operating limitations
- ☐ 14. Placards and location(s)

COMMON ERRORS

- ☐ 1. Airplane familiarity inadequate
- ☐ 2. Recovery not in prescribed sequence
- ☐ 3. Exceeded designed maneuvering V-speed(s)
- ☐ 4. Incipient spin not recognized
- ☐ 5. Premature relaxation of recovery controls
- ☐ 6. Unintentional secondary stall or spin

ASSOCIATED MANEUVERS

- ☐ 1. Slow flight and stall avoidance
- ☐ 2. Departure stalls (power-on stalls)
- ☐ 3. Approach to landing stalls (power-off stalls)
- ☐ 4. Elevator trim stalls (go-around stalls)
- ☐ 5. Cross controlled stalls in gliding turns
- ☐ 6. Accelerated stalls, steep turns power-on

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Stalls" in AC 61-21A, Flight Training Handbook.
- ☐ 3. Demonstrate and explain each of the five cues which warn the PIC of an impending stall, such as; 1.) Vision. 2.) Hearing. 3.) Kinesthesia. 4.) Feel of control pressures. 5.) Flight instruments.
- ☐ 4. Advise the pilot, that a detailed understanding of the manufacturer's stall recovery procedures, and the prompt sequential application of directed actions for each airplane flown is essential.
- ☐ 5. Demonstrate and explain the stall recovery procedures for each airplane flown. Procedures are similar for most small airplanes; i.e., 1.) Reduce throttle to idle and neutralize ailerons. 2.) Apply and hold full rudder opposite to the direction of rotation. If the spin was intentional and disorientation prevents determining the direction or rotation, refer to the turn needle or TC to establish direction of rotation. **Do not refer to the ball indictor.** 3.) Just after the rudder reaches the stop, move the control wheel briskly forward far enough to break the stall. Full down elevator may be required. 4.) Hold these control inputs until rotation stops. 5.) As the rotation stops, neutralize rudder and smoothly recover from the resulting dive. Retract flaps before exceeding V_{FE}. **It is very important to apply the recovery controls in the proper sequence and then "hold" them until recovery occurs.**
- ☐ 6. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Practice entry and recovery of each of the various stalls to develop a keen awareness of the cues warning of an impending stall, and forming the habit of taking prompt and efficient preventive or curative action to avoid the possibility of a spin.
- ☐ 2. Practice verbalizing the spin recovery procedures in the proper sequence.

COMPLETION STANDARDS

- ☐ 1. Pilot has identified and explained the critical flight situations that cause unintentional spins due to lack of pilot attentiveness.
- ☐ 2. Pilot has explained the five cues which warn of impending stall, and if ignored could cause a spin.
- ☐ 3. Pilot has located and explained manufacturer's recovery SOP for each airplane flown.

REFERENCES

AFM	Approved Airplane Flight Manual	AC 61-23B	Pilot's Handbook Of Aeronautical Knowledge
FAA-RD-77-26	General Aviation Pilot Stall Awareness Training Syllabus	AC 61-67B	Stall and Spin Awareness Training
AC 61-21-A	Flight Training Handbook (154)	AC 61-92	Use Of Distractions During Pilot Certification Flight Test

DATE

Straight–and–Level Flight

Basic Instrument Maneuvers

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Preflight Instruction .2
- ☐ CFI Demonstration of Maneuver .3
- ☐ Directed Pilot Application and Practice .5
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ View Limiting Device (IFR Hood)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to attitude instrument flying during straight–and–level flight.
- ☐ 2. Maintains straight–and–level flight solely by reference to instruments using proper instrument cross–check and interpretation, and coordinated control application.
- ☐ 3. Maintains altitude, ±200 feet (60 meters); heading ±20°, and airspeed, ±10 knots.

ELEMENTS

- ☐ 1. Coordinated use of flight controls
- ☐ 2. Instrument scanning (Cross Check)
- ☐ 3. Instrument interpretation
- ☐ 4. Maintenance of attitude
- ☐ 5. Use of trim and power settings
- ☐ 6. Anticipation and planning

ASSOCIATED MANEUVERS

- ☐ 1. Straight and level flight is basic to all flight maneuvers.
- ☐ 2. Straight and level flight is the starting and finishing maneuver of all normal flight.

COMMON ERRORS

- ☐ 1. Prescribed flight criteria ignored
- ☐ 2. Inadequate flight control coordination
- ☐ 3. Failure to use available visual references
- ☐ 4. Failure to properly set AI on the ground
- ☐ 5. Failure to use control friction lock
- ☐ 6. Trimming to desired airspeed ignored
- ☐ 7. Pitch versus power change unbalanced
- ☐ 8. Airspeed, failure to establish or maintain

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required performance criteria.
- ☐ 2. Direct pilot to read the section "Emergency Flight By Reference to Instruments" in AC 61-21A, Flight Training Handbook.
- ☐ 3. Inform pilot that straight and level flight is coordinated flight in which a constant heading and altitude are maintained. It is accomplished by making immediate gentle attuned flight control corrections for deviations in direction and altitude from unintentional slight turns, descents, and climbs detected by instrument scan and interpretation.
- ☐ 4. Demonstrate the techniques to achieve straight flight (constant heading) and level flight (constant altitude) solely by interpretative reference to instruments.
- ☐ 5. Direct pilot practice of instrument scan and interpretation techniques.
- ☐ 6. Evaluate the pilot proficiency, and comprehension of the elements, common errors, and principles involved in the objectives of this lesson.
- ☐ 7. Conduct postflight critique and question and answer period. Preview next lesson.
- ☐ 8. Pilot must be cautioned that this instrument flight training **"is intended as an emergency procedure only"**, and that this is preparatory for future advanced flight training.
- ☐ 9. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Emergency Flight By Reference to Instruments" in AC 61-21A.
- ☐ 3. Practice straight and level flight while perfecting piloting skills and instrument scan techniques to achieve competent execution of the objective.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the ability to fly the airplane with smoothness and accuracy, within the objective tolerances, and performed straight and level flight solely by reference to instruments.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 61-16A	Flight Instructor's Handbook	AC 61-27C	Instrument Flying Handbook (60)
AC 61-21A	Flight Training Handbook (183)		

DATE

Constant Airspeed Climbs

Basic Instrument Maneuvers

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Preflight Instruction	.2
☐ CFI Demonstration of Maneuver	.2
☐ Directed Pilot Application and Practice	.5
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ View Limiting Device (IFR Hood)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to attitude instrument flying during straight, constant airspeed climbs.
- ☐ 2. Establishes the climb configuration specified by the examiner.
- ☐ 3. Transitions to the climb pitch attitude and power setting on an assigned heading using proper instrument cross-check and interpretation, and coordinated control application.
- ☐ 4. Demonstrates climbs solely by reference to instruments at a constant airspeed to specific altitudes in straight flight.
- ☐ 5. Levels off at the assigned altitude and maintains that altitude, ±200 feet (60 meters); maintains heading, ±20°; maintains airspeed, ±10 knots.

ELEMENTS

- ☐ 1. Airspeed vs. power-attitude relationship
- ☐ 2. Altitude and airspeed, maintaining criteria
- ☐ 3. Heading control maintained consistently
- ☐ 4. Anticipate instrument indication
- ☐ 5. Flight control utilization and coordination
- ☐ 6. Instrument scanning (cross check)
- ☐ 7. Instrument interpretation, accurate
- ☐ 8. Trim control utilization
- ☐ 9. Attitude + power = performance
- ☐ 10. Left turning tendencies

ASSOCIATED MANEUVERS

- ☐ 1. Slow flight
- ☐ 2. Straight-and-level flight
- ☐ 3. Medium turns
- ☐ 4. Turns to headings
- ☐ 5. Maximum performance maneuvers
- ☐ 6. Integrated flight instruction (VR and IR)

COMMON ERRORS

- ☐ 1. Airspeed prescribed was not maintained
- ☐ 2. Inadequate anticipation and planning
- ☐ 3. Heading, disregarded assigned heading
- ☐ 4. Aileron, elevator, and rudder, poor control
- ☐ 5. Excessive grip on flight controls
- ☐ 6. Unnecessary attitude correction
- ☐ 7. Failure to trim airplane properly
- ☐ 8. Fixation on a single instrument

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required performance criteria.
- ☐ 2. Direct pilot to read the section "Straight Climbs" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain the technique for entering a straight, constant airspeed climb, using the manufacturer's recommended power settings and airspeeds. Once the airplane is stabilized, have the pilot note the instruments' indications for this maneuver.
- ☐ 4. Demonstrate and simultaneously explain the fundamental skill of continuously cross checking and interpreting the instruments and making the appropriate corrections in airplane attitude, using pitch, power, and bank adjustments to maintain heading and airspeed.
- ☐ 5. Direct pilot practice of instrument scan and interpretation techniques.
- ☐ 6. Evaluate the pilot proficiency, and comprehension of the elements, common errors, and principles involved in the objectives of this lesson.
- ☐ 7. Conduct postflight critique and question and answer period. Preview next lesson.
- ☐ 8. Pilot must be cautioned that this instrument flight training **"is intended as an emergency procedure only"** and that this is preparatory for future advanced flight training.
- ☐ 9. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Straight Climbs" in AC 61-21A.
- ☐ 3. Practice performing the straight, constant airspeed climb, while developing the skills of scanning and interpreting the instrument indications to maintain the proper attitude and objective criteria.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the procedure, and demonstrated the ability to fly the airplane with smoothness and accuracy, within the objective tolerances, and performed straight constant airspeed climbs, solely by reference to instruments.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 61-21A	Flight Training Handbook (185)	AC 61-27C	Instrument Flying Handbook (76)

DATE

Constant Airspeed Descents

Basic Instrument Maneuvers

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Preflight Instruction .2
- ☐ CFI Demonstration of Maneuver .2
- ☐ Directed Pilot Application and Practice .5
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ View Limiting Device (IFR Hood)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to attitude instrument flying during straight, constant airspeed descents.
- ☐ 2. Establishes the descent configuration specified by the examiner.
- ☐ 3. Transitions to the descent pitch attitude and power setting on an assigned heading using proper instrument cross-check and interpretation, and coordinated control application.
- ☐ 4. Demonstrates descents solely by reference to instruments at a constant airspeed to specific altitudes in straight flight.
- ☐ 5. Levels off at the assigned altitude and maintains that altitude, ±200 feet (60 meters); maintains heading, ±20°; maintains airspeed, ±10 knots.

ELEMENTS

- ☐ 1. Airspeed vs. power-attitude relationship
- ☐ 2. Altitude and airspeed, maintaining criteria
- ☐ 3. Heading control maintained consistently
- ☐ 4. Anticipate instrument indication
- ☐ 5. Flight control utilization and coordination
- ☐ 6. Instrument scanning (cross check)
- ☐ 7. Instrument interpretation, accurate
- ☐ 8. Trim control utilization
- ☐ 9. Attitude + power = performance
- ☐ 10. Engine temperature awareness and care

COMMON ERRORS

- ☐ 1. Airspeed prescribed was not maintained
- ☐ 2. Inadequate anticipation and planning
- ☐ 3. Heading, disregarded assignment
- ☐ 4. Aileron, elevator, and rudder, poor control
- ☐ 5. Excessive grip on flight controls
- ☐ 6. Unnecessary attitude correction
- ☐ 7. Failure to trim airplane properly
- ☐ 8. Fixation on a single instrument

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Straight Descents" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain the entry procedure for a constant airspeed descent by reducing airspeed, and by reducing power while holding straight-and-level flight. When the descent speed is established, a further reduction in power is made, and simultaneously the nose is lowered to maintain a constant airspeed. During the maneuver any deviation from the desired airspeed, indicated by the instruments, calls for a pitch and/or power adjustment. Leveling off (recovery) techniques based on the rate of descent are presented and explained. Rule of thumb, lead level off by approximately 10% of the VSI.
- ☐ 4. Demonstrate and simultaneously explain the basic skill of continuously cross checking and interpreting the instruments, and making the appropriate balanced corrections in airplane attitude, using pitch, power, and bank adjustments to hold heading and airspeed.
- ☐ 5. Pilot must be cautioned that this instrument flight training **"is intended as an emergency procedure only"** and that this is preparatory for future advanced flight training.
- ☐ 6. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Straight Descents" in AC 61-21A.
- ☐ 3. Practice performing the straight constant airspeed descent, while developing the skills of scanning and interpreting the instrument indications to maintain the proper attitude and objective requirements.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the procedure, and demonstrated the ability to fly the airplane with smoothness and accuracy, within the objective tolerances, and performed the straight, constant airspeed descent, solely by reference to instruments.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 61-16A	Flight Instructor's Handbook	AC 61-27C	Instrument Flying Handbook (78)
AC 61-21A	Flight Training Handbook (184)		

DATE

Turns To Headings

Basic Instrument Maneuvers

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Preflight Instruction .2
- ☐ CFI Explanation and Demonstration .2
- ☐ Directed Pilot Application and Practice .5
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ View Limiting Device (IFR Hood)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to attitude instrument flying during turns to headings.
- ☐ 2. Transitions to the level–turn attitude using proper instrument cross–check and interpretations, and coordinated control application.
- ☐ 3. Demonstrates turns to headings solely by reference to instruments; maintains altitude, ±200 feet (60 meters); maintains a standard rate turn and rolls out on the assigned heading, ±20°, maintains airspeed, ±10 knots.

ELEMENTS

- ☐ 1. Instrument scanning (cross check)
- ☐ 2. Flight control utilization and coordination
- ☐ 3. Altitude and airspeed, maintaining criteria
- ☐ 4. Standard rate turn is 3° per second
- ☐ 5. Anticipate instrument indication
- ☐ 6. Use of trim controls
- ☐ 7. Instrument interpretation, accurate
- ☐ 8. Trim control utilization
- ☐ 9. Attitude + power = performance
- ☐ 10. Roll rate consistent, starting and recovery

COMMON ERRORS

- ☐ 1. Disorientation, vertigo and dizziness
- ☐ 2. Recovery procedure had poor timing
- ☐ 3. Flight control coordination difficulties
- ☐ 4. Altitude assigned was not maintained
- ☐ 5. Misinterpretation of instruments
- ☐ 6. Fixation on a single instrument
- ☐ 7. Control adjustments erratic
- ☐ 8. Degree of bank inappropriate
- ☐ 9. Slip or skid control problems
- ☐ 10. Trimming off control pressures ignored
- ☐ 11. Overcontrolling airplane
- ☐ 12. Anticipation and planning inadequate

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Turns to Headings" in AC 61-21A.
- ☐ 3. Instruct pilot that precise bank angle for **standard rate of turn** is a product of TAS. The formula to determine bank angle is: (KTAS ×.15), e.g. KTAS of 95 ×.15 = 14.25° angle of bank.
- ☐ 4. Demonstrate and simultaneously explain the turn entry by applying coordinated aileron and rudder pressures, on the roll–in. View attitude indicator to establish approximate angle of bank, then check the miniature aircraft of the turn coordinator to verify a standard rate of turn indication. Explain vertical lift component versus pitch. Recover with a lead of one–half the angle of bank until you have determined the precise lead suitable to technique employed (roll rate). Apply coordinated aileron and rudder pressures in the opposite direction of turn, then stabilize airplane in straight and level flight.
- ☐ 5. Demonstrate and simultaneously explain the basic skill of continuously cross checking and interpreting the instruments, and making the appropriate attuned corrections in airplane attitude, using pitch, power, and bank adjustments to hold bank and altitude.
- ☐ 6. Pilot must be cautioned that this instrument flight training **"is intended as an emergency procedure only"** and that this is preparatory for future advanced flight training.
- ☐ 7. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Turns to Headings" in AC 61-21A.
- ☐ 3. Practice performing turns to headings, while developing the skills of scanning and interpreting the instrument indications to maintaining the proper attitude and objective requirements.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the procedure, and demonstrated the ability to fly the airplane with smoothness and accuracy, within the objective tolerances, and performed turns to headings, solely by reference to instruments, and with competent flight proficiency.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 61-16A	Flight Instructor's Handbook	AC 61-27C	Instrument Flying Handbook (84)
AC 61-21A	Flight Training Handbook (185)		

DATE

Unusual (Critical) Flight Attitudes, Recovery

Basic Instrument Maneuvers

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Explanation and Demonstration .5
- ☐ Pilot Application, Trial and Practice 1.0
- ☐ Postflight Critique and Discussion .5
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ View Limiting Device (IFR Hood)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to attitude instrument flying during unusual attitudes.

☐ 2. Recognizes unusual flight attitudes solely by reference to instruments; recovers promptly to a stabilized level flight attitude using proper instrument cross-check and interpretation and smooth, coordinated control application in the correct sequence.

ELEMENTS

- ☐ 1. Critical flight attitudes, understanding
- ☐ 2. Recovery procedures and techniques
- ☐ 3. Interpretation of instruments, correctly
- ☐ 4. Disorientation (vertigo), recognition
- ☐ 5. Recognition of turn direction, accurately
- ☐ 6. React intelligently versus instinctively
- ☐ 7. Smooth, positive and prompt coordinated use of controls
- ☐ 8. Nose-low spiral attitude, reduce power; level wings, raise nose
- ☐ 9. Loss of outside visual references
- ☐ 10. Load factor versus stall speed

COMMON ERRORS

- ☐ 1. Failure to trim off control pressures
- ☐ 2. Cockpit disorganized
- ☐ 3. Instrument fixations, poor cross-checking
- ☐ 4. Flying by sensory sensations
- ☐ 5. Insufficient instrument understanding
- ☐ 6. Inadequate allocation of attention

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Unusual Attitudes and Recoveries" in AC 61-27C.
- ☐ 3. Explain that any attitude not normally used in the course of flight is considered a critical attitude or unusual attitude, and is not normally required for instrument flight, and is a **"dual training maneuver for emergencies only"**. Unusual attitude may be a result of any number of conditions; for example: turbulence, disorientation, confusion, preoccupation with cockpit duties, carelessness in cross-check, errors in instrument interpretation, or lack of proficiency in basic airplane control.
- ☐ 4. Demonstrate and simultaneously explain the recognition of unusual attitudes, and the techniques for reestablishing orientation, and the correct recovery procedures from nose-high and nose-low critical flight attitudes.
- ☐ 5. Supervise the execution of this training maneuver by having the pilot induce an unusual attitude by covering and/or closing eyes while in straight and level flight. Then direct the pilot to make shallow turns. Once the unusual attitude is achieved, instruct the pilot to uncover and/or open eyes and execute an appropriate recovery procedure.
- ☐ 6. Supervise and evaluate the pilot's recovery techniques from the intentionally induced unusual attitudes established by the CFI, and review common errors.
- ☐ 7. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participates in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Unusual Attitudes and Recoveries" in AC 61-27C.
- ☐ 3. Practice recognizing unusual attitudes through proper interpretation of flight instruments.
- ☐ 4. Practice recovery techniques, from the intentionally induced unusual attitudes established by the flight instructor.

COMPLETION STANDARDS

- ☐ 1. Pilot used proper and effective scanning and turning techniques to clear the area before performing unusual attitudes.
- ☐ 2. Pilot has experienced and promptly recognized an unusual (critical) flight attitude by correctly interpreting the flight instruments, and recovered the airplane to a stabilized level flight attitude with prompt, smooth, coordinated control, applied in the proper sequence.

REFERENCES

AC 61-21A	Flight Training Handbook (186)	AC 61-27C	Instrument Flying Handbook (90)
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	AC 67-2	Medical Handbook For Pilots

DATE

Radio Communications, Navigation Systems Facilities, and Radar Services

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Explanation and Demonstration	.2
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ View Limiting Device (IFR Hood)
- ☐ Aeronautical Charts (Current)
- ☐ Aeronautical Information Manual (AIM)
- ☐ Aircraft Radio(s), NAV/COM System

OBJECTIVE

The FAA requires that the pilot applicant:

1. ☐ Exhibits knowledge of the elements related to radio communications, navigation systems/facilities, and radar services available for use during flight solely by reference to instruments.
2. ☐ Selects the proper frequency and identifies the appropriate facility.
3. ☐ Follows verbal instructions and/or navigation systems/facilities for guidance.
4. ☐ Determines the minimum safe altitude.
5. ☐ Maintains altitude, ±200 feet (60 meters); maintains heading ±20°; maintains airspeed, ±10 knots.

ELEMENTS

- ☐ 1. Communication Frequencies
- ☐ 2. VORs and VORTACs
- ☐ 3. Flight service stations (FSS)
- ☐ 4. Airport towers
- ☐ 5. Approach control facilities
- ☐ 6. Military VHF/DF stations
- ☐ 7. FAA VHF/DF stations
- ☐ 8. Airport Surveillance Radar (AASR)
- ☐ 9. Precision Approach Radar (PAR)
- ☐ 10. Air route traffic control centers (ARTCC)
- ☐ 11. Emergency declaration (Mayday)
- ☐ 12. Transponder squawk (code)
- ☐ 13. Operation of airplane's radios
- ☐ 14. Radio station identification
- ☐ 15. Efficient allocation of attention
- ☐ 16. Terminology and phraseology

COMMON ERRORS

- ☐ 1. Frequency selection was incorrect
- ☐ 2. Aircraft and position, failure to identify
- ☐ 3. Phraseology, obscure and/or improper
- ☐ 4. Panic and not thinking cautiously
- ☐ 5. Cockpit management inadequate
- ☐ 6. Radials versus bearings confusion
- ☐ 7. Radio, initial contact procedures ignored
- ☐ 8. VOR heading vs. reverse sensing error

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Use of Radio Navigation Aids" in AC 61-21A.
- ☐ 3. Familiarize and demonstrate the manufacturer's operating procedures for any and all avionics installed in the airplane. Explain all of the above elements, and that pilot will be expected to utilize and/or operate all navigation equipment such as: Loran, ADF, GPS, etc., and all other systems aboard the airplane.
- ☐ 4. Demonstrate and explain contacting ATC and ask for safe altitude information, and request radar vector guidance.
- ☐ 5. Demonstrate and explain locating, contacting FSS, and requesting a "practice" DF steer using the correct procedures, and complying with all guidance instructions.
- ☐ 6. Direct pilot practice of instrument scan and interpretation techniques.
- ☐ 7. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Use of Radio Navigation Aids" in AC 61-21A.
- ☐ 3. Practice selecting, contacting, and identifying appropriate facilities such as ATC, ARTCC, or FSS and requesting radar vectoring headings, and/or DF steers, and ask or confirm minimum safe altitude, and comply with navigational directions.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the ability to dependably select, tune, and identify VOR and NDB stations, and interpret the signals and navigate to and from them with skill.
- ☐ 2. Pilot has proven his knowledge and ability to complete the objective by utilizing ATC radar vectoring services, DF (direction finding) facilities to confirm safe altitude, and receive and comply with verbal guidance instruction competently.

REFERENCES

AC 61-21A	Flight Training Handbook (188)	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 61-27C	Instrument Flying Handbook	AC 61-84B	Role of Preflight Preparation

DATE

Emergency Descent

Emergency Operations

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Maneuver Objective and Preflight Instruction .2
- ☐ CFI Demonstration of Maneuver .2
- ☐ Directed Pilot Application and Practice .5
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to an emergency descent.
- ☐ 2. Recognizes the urgency of an emergency descent.
- ☐ 3. Establishes the recommended emergency descent configuration and airspeed, and maintains that airspeed, ±5 knots.
- ☐ 4. Demonstrates orientation, division of attention, and proper planning.
- ☐ 5. Follows the appropriate emergency checklist.

ELEMENTS

- ☐ 1. Airplane's structural performance limitations
- ☐ 2. V–speeds and their variance and relevance
- ☐ 3. Positive and negative G forces (load factor)
- ☐ 4. Pilot judgment, decisions, and timing
- ☐ 5. Engine precautions and cooling awareness
- ☐ 6. Emphasize use of checklist/procedures

ASSOCIATED MANEUVERS

- ☐ 1. Emergency landing
- ☐ 2. Steep spiral
- ☐ 3. Gliding spiral
- ☐ 4. Normal glides

COMMON ERRORS

- ☐ 1. Disorientation, vertigo and dizziness
- ☐ 2. Checklist and/or item(s) bypassed
- ☐ 3. Stalled inadvertently, unsafe technique
- ☐ 4. Negative G force inadvertently created

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Descents (Emergency)" in AC 61-21A, and the currect AFM.
- ☐ 3. Advise pilot that this is a procedure for establishing the fastest practical rate of descent during emergency conditions, **within the aircraft's structural and performance limitations**, and configured as recommended by the manufacturer. **In no case should the airplane's never–exceed speed** (V_{NE}), **maximum gear–extended speed** (V_{LE}), **or maximum flap–extended speed** (V_{FE}) be exceeded.
- ☐ 4. Demonstrate and explain the simulated emergency descent, by starting at an altitude high enough to permit recovery at a safe altitude, preferability above or within range of a suitable landing area. Except when prohibited by the manufacturer, initiate the descent by simultaneously rolling into a 45° bank, while reducing power to idle, and apply carburetor heat. Avoid applying any back pressure to the elevator, thus allowing the nose to pitch down below the horizon. This entry method will ensure positive load factors (G forces), and provide an opportunity for searching the area below for any air traffic. The spiral should be continued for at least a 90° heading change, then decide to continue the spiral, or make a straight descent. The landing gear and flaps should be extended to provide maximum drag so that the fastest possible descent can be made. The propeller control (if so equipped) should be placed in the low pitch (or high RPM) position which will allow the propeller to act as an aerodynamic brake to help prevent excessive airspeed during descent. **Maintain a speed high enough to avoid stalling but not above maneuvering speed (Va).** When descent is stabilized select the appropriate checklist for the emergency, and complete the checks.
- ☐ 5. Demonstrate and explain that as soon as all prescribed procedures are completed the maneuver should be terminated to avoid extreme engine cooling. During recovery, if in a spiral, roll the wings level before applying control pressure to stop the descent, than retract landing gear and flaps.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Descents (Emergency)" in AC 61-21A, and recommendations in the AFM/POH.
- ☐ 3. Study and rehearse each of the emergency checklists such as, in–flight fire, decompression, etc.
- ☐ 4. Complete supervised practice of the emergency descent as outlined in the objective and AFM.

COMPLETION STANDARDS

- ☐ 1. Pilot has recognized and explained all the emergencies that would require an immediate descent.
- ☐ 2. Pilot has explained the procedures, and demonstrated the ability to perform the maneuver with smoothness and accuracy, while adhering to the objective criteria with competent pilot skills.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 61-21A	Flight Training Handbook (160)	AFM	Approved Airplane Flight Manual

DATE

Emergency Approach and Landing (Simulated)

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Explanation and Demonstration .2
- ☐ Directed Pilot Application and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to emergency approach and landing procedures.
- ☐ 2. Establishes and maintains the recommended best-glide attitude, configuration, and airspeed, ±10 knots.
- ☐ 3. Selects a suitable emergency landing area within gliding distance.
- ☐ 4. Plans and follows a flight pattern to the selected landing area considering altitude, wind, terrain, and obstructions.
- ☐ 5. Attempts to determine the reason for the malfunction and makes the correction, if possible.
- ☐ 6. Maintains positive control of the airplane at all times.
- ☐ 7. Follows the appropriate emergency checklist.

ELEMENTS

- ☐ 1. Planning and timing approach
- ☐ 2. Constant airspeed and control
- ☐ 3. Flight control coordination
- ☐ 4. Glide attitude, suggest V_Y
- ☐ 5. Selection of landing area
- ☐ 6. Emergency cockpit procedures
- ☐ 7. Checklist is strongly recommended
- ☐ 8. "Key" position
- ☐ 9. Accuracy in judgment
- ☐ 10. CFR's 91.13, 91.119
- ☐ 11. Manufacturer's recommendations
- ☐ 12. Wind direction and velocity
- ☐ 13. Available altitude
- ☐ 14. Terrain suitability

ASSOCIATED MANEUVERS

- ☐ 1. Descents without power
- ☐ 2. Gliding spirals
- ☐ 3. Precision approaches
- ☐ 4. Slips
- ☐ 5. Short or soft-field landings
- ☐ 6. Precautionary landing

COMMON ERRORS

- ☐ 1. Uncertainty and indecision
- ☐ 2. Airspeed allowed to become excessive
- ☐ 3. Planning and timing unsatisfactory
- ☐ 4. Landing area selection hazardous
- ☐ 5. Maneuvering, errors in judgment
- ☐ 6. Glide distance attempt unreasonable
- ☐ 7. Landing touchdown premature
- ☐ 8. Misunderstanding as to who is PIC

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read "Emergency Approaches (Simulated)" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain different emergencies such as fire in flight, electrical or hydraulic systems malfunctions, sudden severe weather, imminent fuel exhaustion.
- ☐ 4. Demonstrate all the variables such as altitude, obstructions, wind direction, landing direction, landing surface and gradient. The landing distance requirements of the airplane will determine the pattern and approach techniques actually utilized. Strongly advise checklist use.
- ☐ 5. Instruct pilot to consider a different route at night, e.g., a course comprised of a series of 25° zig-zags is only 10% longer. This may keep the airplane in reach of an airport. Assuming most light airplanes provide a glide ratio of 8:1, or better, when flying at 10,000 AGL, it is possible to glide 16 miles, perhaps to an airport.
- ☐ 6. Supervise pilot's practice of emergency approach and landing (simulated).

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Emergency Approaches (Simulated)" in AC 61-21A.
- ☐ 3. Complete supervised practice of simulated emergency approaches and landings, using manufacturer's recommended checklist, and complying with CFR's.

COMPLETION STANDARDS

- ☐ 1. Pilot has practiced emergency approaches and landings, and demonstrated the ability to apply the above elements to successfully complete the objective standards, and has explained the necessary techniques and procedures.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 61-21A	Flight Training Handbook (116)	AFM	Approved Airplane Flight Manual

DATE

Systems and Equipment Malfunctions

Emergency Operations

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Explanation and Demonstration .2
- ☐ Directed Pilot Application and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to system and equipment malfunctions appropriate to the airplane provided for the flight test.

☐ 2. Analyzes the situation and takes the appropriate action for simulated emergencies, such as –

- (a) partial or complete power loss.
- (b) engine roughness or overheat.
- (c) carburetor or induction icing.
- (d) loss of oil pressure.
- (e) fuel starvation.
- (f) electrical system malfunction.
- (g) flight instruments malfunction.
- (h) landing gear or flap malfunction.
- (i) inoperative trim.
- (j) inadvertent door or window opening.
- (k) structural icing.
- (l) smoke/fire/engine compartment fire.
- (m) any other emergency appropriate to the airplane provided for the flight test.

☐ 3. Follows the appropriate emergency checklist.

ELEMENTS

- ☐ 1. Emergency, recognition of abnormalities
- ☐ 2. Malfunctions, attempt to identify/correct
- ☐ 3. Procedures, adoption of alternate action
- ☐ 4. Systems and component familiarity
- ☐ 5. Emergency checklist current and available
- ☐ 6. Observation of indicators and gauges
- ☐ 7. Emergency radio procedures
- ☐ 8. Emergency transponder codes

ASSOCIATED MANEUVERS

- ☐ 1. Other operational flight maneuvers
- ☐ 2. Simulated forced landings
- ☐ 3. Emergency and special maneuvers
- ☐ 4. Diversion of flight
- ☐ 5. Lost procedures
- ☐ 6. Airplane visual inspection procedures

COMMON ERRORS

- ☐ 1. Inaccurate analysis of malfunction
- ☐ 2. Checklist ignored, negligent actions
- ☐ 3. Ignoring effective alternate action
- ☐ 4. Failure to act in a timely fashion

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Emergency Procedures" in AFM and/or POH.
- ☐ 3. Instruct pilot that in–flight emergencies created by the failure or malfunction of one or more systems or components may be broadly classified in one of two groups: those requiring immediate action, or those which allow sufficient time for thoughtful consideration of the situation before remedial action is initiated.
- ☐ 4. Demonstrate the recognition of emergencies which demand an immediate corrective action, and are governed by manufacturer's recommended procedures check list, for ease of familiarization and application, such as: engine failure, engine compartment fire, fuel starvation, carburetor or induction icing, etc.
- ☐ 5. Demonstrate all other emergencies specified above, those which do not demand immediate action but are inherent with the in–flight operation of light single–engine airplanes with respect to probable cause, effect, and best corrective action to improve the problem, or abnormalities of function, efficiently and safely.
- ☐ 6. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Emergency Procedures" in AFM and/or POH.
- ☐ 3. Complete supervised practice of identifying and resolving simulated emergencies.

COMPLETION STANDARDS

☐ 1. Pilot has preparedly experienced, identified, and explained in–flight malfunctions, and determined the immediacy of the problem(s) and/or emergency, and instinctively employed the remedial action (manufacturer's recommended procedure check list) appropriate to the situation competently.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	POH	Pilot's Operating Handbook
AC 61-21A	Flight Training Handbook (117)	AFM	Approved Airplane Flight Manual

DATE

Emergency Equipment and Survival Gear

Emergency Operations

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Explanation and Demonstration .5
- ☐ Directed Pilot's Method of Operation or Use .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ Aeronautical Information Manual (AIM)
- ☐ Blackboard or Graphics Pad
- ☐ Emergency Equipment and Survival Gear

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to emergency equipment and survival gear appropriate to the airplane provided for the flight test, such as –
- (a) location in the airplane.
- (b) method of operation or use.
- (c) servicing requirement.
- (d) method of safe storage.
- (e) equipment and survival gear appropriate for operation in various climates and topographical environments.

☐ 2. Follows the appropriate emergency checklist.

ELEMENTS

- ☐ 1. Emergency radio transmissions (Mayday)
- ☐ 2. Fire extinguisher(s) (Hand Held)
- ☐ 3. Over water flight, safe operation procedures
- ☐ 4. Mountainous terrain
- ☐ 5. Remote wilderness and/or desert vs. arctic
- ☐ 6. Manufacturer's recommended procedures
- ☐ 7. Emergency transponder operation
- ☐ 8. Emergency visual flight rules and assistance
- ☐ 9. Survival/signal gear appropriate for flight
- ☐ 10. Carbon monoxide (CO) detection system
- ☐ 11. Emergency exit and evacuation procedures
- ☐ 12. Life raft(s) and life preserver(s) vs. passengers
- ☐ 13. Emergency markings and placards
- ☐ 14. Emergency static air source system
- ☐ 15. Emergency landing gear extension system
- ☐ 16. Emergency locator transmitter (ELT)
- ☐ 17. Familiarity with equipment and procedures
- ☐ 18. Emergency checklist readily available

COMMON ERRORS

- ☐ 1. Equipment operation or use unfamiliar
- ☐ 2. Emergency equipment location unknown
- ☐ 3. Emergency preparations inadequate
- ☐ 4. Maintenance and/or servicing ignored
- ☐ 5. Emergency checklist unavailable immediately
- ☐ 6. Storage of equipment inappropriate

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Emergency Procedures" in the approved airplane flight manual.
- ☐ 3. Demonstrate and explain the requirement of the pilot to be familiar with all emergency equipment and survival gear aboard the airplane. This must include the location, proper and convenient storage, maintenance inspections, and servicing, i.e., new batteries, etc. Additionally the pilot must understand the manufacturer's operating procedures and method of use of all equipment. Familiarize the pilot with the appropriate selection of equipment and gear for the geographical area and weather conditions where the flight is to be conducted.
- ☐ 4. Demonstrate, explain, and insure that the pilot is familiar with the approved emergency checklist, and that it is immediately available, and complied with, in the event of an emergency.
- ☐ 5. Direct pilot practice of completing emergency checklist routine promptly and accurately.
- ☐ 6. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Emergency Procedures" in the applicable and approved airplane flight manual.
- ☐ 3. Practice selecting the appropriate emergency equipment and survival gear for various climates and topographical environments.
- ☐ 4. Learn the location of all the emergency equipment and survival gear and the method of servicing and operating while practicing completing the emergency checklist routine.

COMPLETION STANDARDS

- ☐ 1. Pilot has inspected all emergency equipment to ensure that it is functional and in compliance with maintenance requirements, and appropriate for the geographical area and seasonal conditions.
- ☐ 2. Pilot has explained and demonstrated the ability to locate and correctly operate all of the emergency gear aboard the airplane, while adhering to the AFM recommended procedures/checklist.

REFERENCES

AC 61-21-A	Flight Training Handbook	AC 20-42C	Hand Fire Extinguishers For Use In Aircraft
CFR	Part 61, and Part 91	VEOG	Emergency Locator Transmitters (ELT's), #54

DATE

Night Preparation

Night Operations

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Explanation and Demonstration	.5
☐ Directed Pilot Application and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition Night VFR)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ Aeronautical Charts (Current)
- ☐ Flight Plan Form(s) and Flight Log(s)
- ☐ Clipboard/Mapboard, and Flashlight (Red Lens)

OBJECTIVE

The FAA requires that the pilot applicant exhibits knowledge of the elements related to night operations by explaining:

- ☐ 1. Physiological aspects of night flying including the effects of changing light conditions, coping with illusions, and how the pilot's physical condition affects visual acuity.
- ☐ 2. Lighting systems identifying airports, runways, taxiways and obstructions, and pilot controlled lighting.
- ☐ 3. Airplane lighting systems.
- ☐ 4. Personal equipment essential for night flight.
- ☐ 5. Night orientation, navigation, and chart reading techniques.
- ☐ 6. Safety precautions and emergencies peculiar to night flying.

ELEMENTS

- ☐ 1. Factors related to night vision
- ☐ 2. Airport/ Facility Directory utilization
- ☐ 3. Airplane lights checked prior to starting
- ☐ 4. Cockpit organization and management
- ☐ 5. Manufacturer's emergency procedures
- ☐ 6. In-flight orientation procedures and checks

COMMON ERRORS

- ☐ 1. Off-center viewing technique ignored
- ☐ 2. Electrical system, familiarity inadequate
- ☐ 3. Checklist routine and/or item(s) bypassed
- ☐ 4. Emergency checklist not readily available

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the six parts of the lesson objective, and each of the above elements, emphasizing off-center viewing, visual perception, and the additional caution required for night safety.
- ☐ 2. Direct pilot to read the section "Night Flying" in AC 61-21A, and in AC 67-2.
- ☐ 3. Explain the dual structure of the eye and how the light-sensitive nerves affect vision, such as: 1) cones for color/distance day only, and 2) rods for grey/peripheral day and night. Also that it takes 30 minutes for the rods to adjust to darkness. Also advise that reliable eyesight depends upon pilot's physical condition. Fatigue, colds, vitamin deficiency, alcohol, stimulants, smoking, or medication **can seriously impair the pilot's night vision** much more so than in the day time.
- ☐ 4. Demonstrate and explain the airport's lighting systems, including the proper use of the A/FD, and the importance of determining the specific lighting systems available at the airports of intended use. Also procedures for controlling or requesting activation of systems. Ensure that the pilot is thoroughly familiar with the CFR requiring airplane electrical source(s). Review AFM procedures for operating the interior and exterior lighting systems for the specific airplane to be operated at night.
- ☐ 5. Advise and recommend to the pilot, to carry in the cockpit two reliable flashlights, one red and one white, (with spare batteries) that are readily available for the preflight and flight cockpit duties.
- ☐ 6. Advise the pilot that **it is essential to make a greater use of the flight instruments**, if flight orientation is to be maintained. Stress proper instrument scanning. Caution pilot about possible illusions, such as autokinesis (stationary light appears to move), etc. Encourage pilot to select checkpoints that are clearly discernible at night, and advise to make full use of available radio navigation aids. Review the techniques for reading charts at night with a red light, and marking routes in heavy black lines.
- ☐ 7. Demonstrate and explain the AFM procedures for night engine failure. Ensure that pilot maintains positive control of the airplane in level-landing attitude until the ground is contacted, in an upwind.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Night Flying" in AC 61-21A, and in AC 67-2.
- ☐ 3. Complete supervised night preflight planning, preparation, and night cross-country flight while utilizing all the required cautions, techniques and procedures presented to ensure safe flight.

COMPLETION STANDARDS

- ☐ 1. Pilot has evidenced understanding of every aspect of the above objective by comprehensive explanation of eye adaptation, illusions, orientation, flight preparation, navigation, and emergencies.
- ☐ 2. Pilot planned and completed a night flight while employing competent judgment, caution, and considerations consistent with restricted visibility flight, that closely parallels instrument flight techniques.

REFERENCES

AC 67-2	Medical Handbook For Pilots	CFR	61.57 (d), 61.109, 91.151, 91.209, 91.205
AC 61-21A	Flight Training Handbook (193)	A/FD	Airport/ Facility Directory
AIM	Aeronautical Information Manual	AC 00-6-A	Aviation Weather

DATE

Night Flight

Night Operations

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Demonstration and Explanation	.7
☐ Pilot Application, Trial and Practice	2.5
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition Night VFR)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ Aeronautical Charts (Current)
- ☐ Flight Plan Form(s) and Flight Log(s)
- ☐ Clipboard/Mapboard, and Flashlight (Red Lens)

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to night flight.
- ☐ 2. Inspects the interior and exterior of the airplane with emphasis on those items essential for night flight.
- ☐ 3. Taxies and accomplishes the before takeoff check, adhering to good operating practice for night conditions.
- ☐ 4. Performs takeoffs and climbs with emphasis on visual references.
- ☐ 5. Navigates and maintains orientation under VFR conditions.
- ☐ 6. Approaches, lands, and taxies, adhering to good operating practices for night conditions.
- ☐ 7. Completes all appropriate checklists.

ELEMENTS

- ☐ 1. Night takeoff, plan and fly as IFR procedure
- ☐ 2. Cockpit organization vital for night flight
- ☐ 3. Wind direction and speed awareness
- ☐ 4. Pilotage versus dead reckoning at night

COMMON ERRORS

- ☐ 1. Flight instruments, inadequate cross-checking
- ☐ 2. Critical flight attitude, inadvertently entered
- ☐ 3. Final approach for landing, low and slow
- ☐ 4. Go-around situation not recognized

INSTRUCTOR'S ACTIONS

- ☐ 1. Demonstrate and explain the proper night preflight inspection using a flashlight and the AFM checklist, with emphasis on cockpit and instrument panel lights and switches, taxi and/or landing light(s), anticollision light system, and position lights. Check that there is a working and adequate electrical source, and verify that spare fuses as recommended by the AFM are aboard the airplane.
- ☐ 2. Demonstrate and explain night taxi procedures, use taxi light or landing light with caution (don't blind other pilots). Taxi slowly with extra care on the ramp. Taxiway lines should be followed to ensure a proper safe path. At the runup area, set the parking brake; the airplane could creep forward without being noticed unless the pilot is alert. Emphasize night vision, illusions, and vertigo.
- ☐ 3. Demonstrate and explain night takeoffs and climbs. With cockpit lights set for minimum brightness and trim set for takeoff, the primary difference between night versus day is the cross-check of flight instruments and the lack of outside visual clues. Don't forcibly pull the airplane off the runway. Verify and maintain a positive rate of climb and don't turn until reaching maneuvering altitude.
- ☐ 4. Demonstrate and explain night navigation and orientation procedures and techniques. Generally, at night it is difficult to see clouds and restrictions to visibility. Under no circumstances should a VFR night flight be made during poor or marginal weather conditions. Pilot must acquire competency in straight-and-level flight, straight climbs and descent, level turns and climbing and descending turns. Recovery from unusual attitudes also should be reviewed, **but only on dual flights.**
- ☐ 5. Demonstrate and explain the night approach and landing, and use of AFM checklist. Pilot should identify and fly towards the airport beacon until the runway lights are distinguishable. Fly a normal traffic pattern and approach, keeping runway and/or beacon in sight. A low shallow approach is definitely inappropriate; pilot must depend more on flight instruments. The ASI, ALT and VSI should be constantly cross-checked against the airplane's position along the base leg and final approach. Judgment of height, speed, and sink rate is impaired, so the roundout may be started when the runway lights at the far end of the runway first appear to be rising higher than the airplane. At that point the roundout for touchdown should be started smoothly and the throttle gradually reduced to idle as the airplane is touching down. After landing checklist should be completed.

PILOT'S ACTIONS

- ☐ 1. Complete supervised practice of preflight inspection, taxiing, checklist compliance, takeoff, orientation, approach and landing, while adhering to safe operating procedures for night conditions.

COMPLETION STANDARDS

- ☐ 1. Pilot has completed a night flight, while employing all of the visual techniques, AFM inspection procedures, night flight planning, taxi cautions, takeoff and landing, using both VR and IR completely.

REFERENCES

AC 67-2	Medical Handbook For Pilots	CFR	61.57 (d), 61.109, 91.151, 91.209, 91.205
AC 61-21A	Flight Training Handbook (193)	A/FD	Airport/ Facility Directory
AIM	Aeronautical Information Manual	AC 00-6A	Aviation Weather

DATE

After Land Procedures

Postflight Procedure

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Explanation of After-Landing Procedures .3
- ☐ CFI Demonstration of Postflight Techniques .2
- ☐ Directed Pilot Application and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ Aeronautical Information Manual
- ☐ Airport/ Facility Directory
- ☐ Airport Runway and Taxi Diagram
- ☐ Code of Federal Regulation 91.13
- ☐ FAA-Approved Airplane Flight Manual (AFM)

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to after-landing procedures.
- ☐ 2. Taxies to the parking/refueling area using the proper wind control technique and obstacle avoidance procedures.
- ☐ 3. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Pilot's attention, proper division & allocation
- ☐ 2. Landing roll deceleration & direction control
- ☐ 3. Airplane control technique vs. wind direction
- ☐ 4. Hold short instructions, intersecting runways
- ☐ 5. Speed control, when exiting active runway
- ☐ 6. Flap retraction vs. landing gear - caution
- ☐ 7. Controlled airport vs. uncontrolled airport
- ☐ 8. Obstacle awareness avoidance
- ☐ 9. Airport layout and utilization of A/FD
- ☐ 10. Request progressive taxi instructions
- ☐ 11. Runways and taxiways, crossing rules
- ☐ 12. Ground maneuvering, safety and visibility
- ☐ 13. Clearing runway procedures and cautions
- ☐ 14. Changing ATC radio frequencies
- ☐ 15. Engine cooling procedures
- ☐ 16. Carburetor heat vs. unfiltered air to engine
- ☐ 17. Propeller or engine blast awareness
- ☐ 18. Parking/refueling area familiarity & caution
- ☐ 19. Judgment, pilot making responsible decisions
- ☐ 20. Completion of mfg's. post-landing checklist

COMMON ERRORS

- ☐ 1. Complacency and lack of attentiveness
- ☐ 2. Retracted land gear on the runway
- ☐ 3. Airplane strobe lights not turned off
- ☐ 4. Stopped on or partially on active runway
- ☐ 5. ATC taxi instructions executed improperly
- ☐ 6. Allocation of attention inadequate
- ☐ 7. Taxi direction signs to runways, confusing
- ☐ 8. Taxiing and turning at excessive speeds
- ☐ 9. Taxi frequency was not monitored
- ☐ 10. Checklist routine and/or item(s) bypassed

INSTRUCTOR'S ACTIONS

- ☐ 1. Explained the task object, and the need for pilot's full attention to this phase of airplane operation.
- ☐ 2. Advise pilot to employ due diligence while clearing the active runway and taxiing to parking/fueling area, and to avoid the potentially hazardous tendency of relaxing attentiveness prematurely.
- ☐ 3. Direct pilot to read the sections "Clearing The Runway After Landing" and "After Landing Check" in AC 61-23B and AC 61-21A respectfully. Additionally, pilot should review POH and A/FD.
- ☐ 4. Demonstrate and explain procedures, techniques, and cautions that must be employed while exiting an active runway in accordance with local rules, CFR's, airport signage, and manufacturer's published operating instructions, to ensure a safe transition from flight to ground operation of airplane. **Thoroughly explain the necessity of the pilot to divide attention between the cockpit and the airport environment while using the proper wind control technique and obstacle avoidance procedures.**
- ☐ 5. Supervise pilot's practice of after landing procedures while employing all of the above elements.
- ☐ 6. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Complete the above reading assignments, and review and/or study the airport layout in the A/FD.
- ☐ 3. Become familiar with checklist, airport layout and the habit of attention allocation techniques.
- ☐ 4. Practice after landing procedures, including landing roll deceleration, utilization of proper control positioning in relation to surface winds, while making turns to exit active runway and remaining clear of all obstacles, and following the manufacturer's recommended checklist including proper engine cooling and cautions.

COMPLETION STANDARDS

- ☐ 1. Pilot has successfully completed an oral examination of postflight operations, by thoroughly explaining the above elements as they relate to after-landing procedures.
- ☐ 2. Pilot has demonstrated safe postflight procedures by competently exiting active runway, while maintaining a safe speed during ground operations, and simultaneously employing the correct wind control techniques and completing all manufacturer's checklist items in a proper and timely fashion.

REFERENCES

AC 61-21A	Flight Training Handbook (51)	A/FD	Airport/ Facility Directory
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	AFM	Approved Airplane Flight Manual

DATE

Parking and Securing Airplane

Postflight Procedure

Practical Test Standards – Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Explanation of Checklist Items .2
- ☐ CFI Demonstration of Checklist Items .3
- ☐ Pilot Application, Trial and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane (Airworthy Condition)
- ☐ Manufacturer's Recommended Checklist
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Airport/ Facility Directory
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to parking and securing procedures. This shall include an understanding of parking hand signals and deplaning passengers.

☐ 2. Parks the airplane properly, considering other aircraft and the safety of nearby persons and property on the ramp.

☐ 3. Follows the recommended procedure for engine shutdown and securing the cockpit and the airplane.

☐ 4. Performs a satisfactory postflight inspection.

☐ 5. Completes the appropriate checklist.

ELEMENTS

- ☐ 1. Safety precautions emphasized
- ☐ 2. Speed control, departing active runway
- ☐ 3. Flight control position versus wind effect
- ☐ 4. Manufacturer's recommended checklist
- ☐ 5. Parking area, safe and hazard protected
- ☐ 6. Securing systems, controls, and airplane
- ☐ 7. Service and maintenance request
- ☐ 8. Pilot logbook, post flight data immediately

COMMON ERRORS

- ☐ 1. Master switch, neglected to turn off
- ☐ 2. Control locks, failed to install (interior)
- ☐ 3. Flight time, failed to record accurately
- ☐ 4. Equipment discrepancies, failed to note
- ☐ 5. Signalman's uniform hand signs ignored
- ☐ 6. Wheel chocks, and tie downs, not secure

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Explain that a flight is never complete until the engine is shut down and the airplane is secured inside and out.
- ☐ 3. Demonstrate the correct procedure for taxiing to a designated or suitable parking area, considering wind and obstructions, and parking the airplane properly.
- ☐ 4. Demonstrate using the manufacturer's recommended checklist to shut down the engine and secure cockpit equipment, instruments, avionics and interior control locks.
- ☐ 5. Demonstrate and simultaneously explain the need for pilot to develop the practical habit of performing a thorough postflight inspection to determine any discrepancies and bring them to the attention of the appropriate personnel for prompt servicing in an attempt to avoid any unnecessary future flight delays.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of lesson objective, and the required knowledge criteria.
- ☐ 2. Discipline one self to the fact that a flight is never complete **until the engine is shut down and the airplane is secured inside and out.**
- ☐ 3. Practice the correct procedure for taxiing to a designated or suitable parking area, considering wind and obstructions, and parking the airplane properly.
- ☐ 4. Practice using the manufacturer's recommended checklist to shut down the engine and secure cockpit equipment, instruments, avionics and interior control locks.
- ☐ 5. Practice conducting a satisfactory postflight inspection.

COMPLETION STANDARDS

- ☐ 1. Pilot is aware that the after–landing check should be performed only after the airplane is brought to a complete stop clear of the active runway.
- ☐ 2. Pilot has demonstrated and explained the correct procedures used to taxi to the designated parking area, and maintained the proper position for the flight controls, and parked the airplane properly, and safely deplaned passengers.
- ☐ 3. Pilot has explained and demonstrated that because of different features and equipment in various airplanes, the after–landing checklist provided by the manufacturer should be used.
- ☐ 4. Pilot has developed the habit of securing the airplane and performing a thorough postflight inspection and advising appropriate personnel of any discrepancies, and requesting service.

REFERENCES

AC 61-21A	Flight Training Handbook (57)	A/FD	Airport/ Facility Directory
AFM	Approved Airplane Flight Manual	AC 00-34A	Aircraft Ground Handling and Servicing

Instrument and Equipment Requirements

Title 14 of the Code of Federal Regulations (CFR) § 91.205

Adapted Excerpts

VFR Day - Instruments and Equipment

1. Airspeed indicator.
2. Altimeter.
3. Magnetic direction indicator.
4. Tachometer for each engine.
5. Oil pressure gauge for each engine.
6. Temperature gauge for each liquid-cooled engine.
7. Oil temperature gauge for each air-cooled engine.
8. Manifold pressure gauge for each altitude engine.
9. Fuel gauge - quantity of each tank.
10. Landing gear position indicator, if the aircraft has a retractable landing gear.
11. Approved flotation gear for each occupant if flight beyond gliding distance form shore.
12. Safety belt for each occupant, 2 years of age or older.
13. Shoulder harness for each seat.
14. Emergency locator transmitter (ELT).

VFR Night - Instruments and Equipment

1. Instruments and equipment specified for VFR day.
2. Approved position lights.
3. Approved anticollision light system.
4. Electric landing light if aircraft operated for hire.
5. An adequate source of electrical energy for all installed electrical and radio equipment.
6. One spare set of fuses, or three spare fuses of each kind required, that are accessible to the pilot in flight.

IFR - Instruments and Equipment

1. Instruments and equipment specified for VFR day and night.
2. Two-way radio communications system and navigational equipment appropriate to the ground facilities to be used.
3. Gyroscopic rate-of-turn indicator.
4. Slip-skid indicator.
5. Sensitive altimeter adjustable for barometric pressure.
6. A clock displaying hours, minutes, and seconds with a sweep-second pointer or digital presentation.
7. Generator or alternator of adequate capacity.
8. Gyroscopic pitch and bank indicator (artificial horizon).
9. Gyroscopic direction indicator (directional gyro or equivalent).
10. Flight at and above 24,000 ft. MSL (FL 240). If VOR navigational equipment is required, approved distance measuring equipment (DME) is also required.

Title 14 of the Code of Federal Regulations (CFR) Part 61

Private Pilot (Airplane Single-Engine Land) FAA Eligibility Requirements

Adapted Excerpts

Subpart E

§61.102 APPLICABILITY

This subpart prescribes the requirements for the issuance of private pilot certificates and ratings, the conditions under which those certificates and ratings are necessary, and the general operating rules for persons who hold those certificates and ratings.

§61.103 ELIGIBILITY REQUIREMENTS: GENERAL

To be eligible for a private pilot certificate, a person must:

(a) Be at least 17 years of age for a rating in other than a glider or balloon.

(b) Be at least 16 years of age for a rating in a glider or balloon.

(c) Be able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's pilot certificate as are necessary for the safe operation of the aircraft.

(d) Receive a logbook endorsement from an authorized instructor who:
  (1) Conducted the training or reviewed the person's home study on the aeronautical knowledge areas listed in §61.105(b) of this part that apply to the aircraft rating sought; and
  (2) Certified that the person is prepared for the required knowledge test.

(e) Pass the required knowledge test on the aeronautical knowledge areas listed in §61.105(b) of this part.

(f) Receive flight training and a logbook endorsement from an authorized instructor who:
  (1) Conducted the training in the areas of operation listed in §61.107(b) of this part that apply to the aircraft rating sought; and
  (2) Certified that the person is prepared for the required practical test.

(g) Meet the aeronautical experience requirements of this part that apply to the aircraft rating sought before applying for the practical test.

(h) Pass a practical test on the areas of operation listed in §61.107(b) of this part that apply to the aircraft rating sought.

(i) Comply with the appropriate sections of this part that apply to the aircraft category and class rating sought.

§61.105 AERONAUTICAL KNOWLEDGE

(a) General. A person who is applying for a private pilot certificate must receive and log ground training from an authorized instructor or complete a home-study course on the aeronautical knowledge areas of paragraph (b) of this section that apply to the aircraft category and class rating sought.

(b) Aeronautical knowledge areas.
  (1) Applicable Federal Aviation Regulations of this chapter that relate to private pilot privileges, limitations, and flight operations;
  (2) Accident reporting requirements of the National Transportation Safety Board;
  (3) Use of the applicable portions of the "Aeronautical Information Manual" and FAA advisory circulars;
  (4) Use of aeronautical charts for VFR navigation using pilotage, dead reckoning, and navigation systems;
  (5) Radio communication procedures;
  (6) Recognition of critical weather situations from the ground and in flight, windshear avoidance, and the procurement and use of aeronautical weather reports and forecasts;
  (7) Safe and efficient operation of aircraft, including collision avoidance, and recognition and avoidance of wake turbulence;
  (8) Effects of density altitude on takeoff and climb performance;
  (9) Weight and balance computations;
  (10) Principles of aerodynamics, powerplants, and aircraft systems;
  (11) Stall awareness, spin entry, spins, and spin recovery techniques for the airplane and glider category ratings;
  (12) Aeronautical decision making and judgment; and
  (13) Preflight action that includes–
    (i) How to obtain information on runway lengths at airports of intended use, data on takeoff and landing distances, weather reports and forecasts, and fuel requirements; and
    (ii) How to plan for alternatives if the planned flight cannot be completed or delays are encountered.

§61.107 FLIGHT PROFICIENCY

(a) General. A person who applies for a private pilot certificate must receive and log ground and flight training from an authorized instructor on the areas of operation of this section that apply to the aircraft category and class rating sought.

(b) Areas of operation. ▸

(1) For an airplane category rating with a single- engine class rating:
  (i) Preflight preparation;
  (ii) Preflight procedures;
  (iii) Airport and seaplane base operations;
  (iv) Takeoffs, landings, and go-arounds;
  (v) Performance maneuvers;
  (vi) Ground reference maneuvers;
  (vii) Navigation;
  (viii) Slow flight and stalls;
  (ix) Basic instrument maneuvers;
  (x) Emergency operations;
  (xi) Night operations, except as provided in §61.110 of this part; and
  (xii) Postflight procedures.

§61.109 AERONAUTICAL EXPERIENCE

(a) For an airplane single-engine rating. Except as provided in paragraph (i) 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 in preparation for the practical test in a single-engine airplane, which must have been performed within 60 days preceding the date 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 at least 150 nautical miles total distance, with full-stop landings at a minimum of three points, and one segment of the flight consisting of a straight-line distance of at least 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.
(i) Permitted credit for use of a flight simulator or flight training device.
  (1) Except as provided in paragraphs (i)(2) of this section, a maximum of 2.5 hours of training in a flight simulator or flight training device representing the category, class, and type, if applicable, of aircraft appropriate to the rating sought, may be credited toward the flight training time required by this section, if received from an authorized instructor.
  (2) A maximum of 5 hours of training in a flight simulator or flight training device representing the category, class, and type, if applicable, of aircraft appropriate to the rating sought, may be credited toward the flight training time required by this section if the training is accomplished in a course conducted by a training center certificated under part 142 of this chapter.
  (3) Except when fewer hours are approved by the Administrator, an applicant for a private pilot certificate with an airplane, rotorcraft, or powered-lift rating, who has satisfactorily completed an approved private pilot course conducted by a training center certificated under part 142 of this chapter, need only have a total of 35 hours of aeronautical experience to meet the requirements of this section.

§61.110 NIGHT FLYING EXCEPTIONS

(a) Subject to the limitations of paragraph (b) of this section, a person is not required to comply with the night flight training requirements of this subpart if the person receives flight training in and resides in the State of Alaska.
(b) A person who receives flight training in and resides in the State of Alaska but does not meet the night flight training requirements of this section:
  (1) May be issued a pilot certificate with a limitation "Night flying prohibited;" and
  (2) Must comply with the appropriate night flight training requirements of this subpart within the 12-calendar-month period after the issuance of the pilot certificate. At the end of that period, the certificate will become invalid for use until the person complies with the appropriate night training requirements of this subpart. The person may have the "Night flying prohibited" limitation removed if the person–
    (i) Accomplishes the appropriate night flight training requirements of this subpart; and
    (ii) Presents to an examiner a logbook or training record endorsement from an authorized instructor that verifies accomplishment of ▶

the appropriate night flight training requirements of this subpart.

§61.111 CROSS-COUNTRY FLIGHTS: PILOTS BASED ON SMALL ISLANDS

(a) Except as provided in paragraph (b) of this section, an applicant located on an island from which the cross-country flight training required in §61.109 of this part cannot be accomplished without flying over water for more than 10 nautical miles from the nearest shoreline need not comply with the requirements of that section.

(b) If other airports that permit civil operations are available to which a flight may be made without flying over water for more than 10 nautical miles from the nearest shoreline, the applicant must show completion of two round-trip solo flights between those two airports that are farthest apart, including a landing at each airport on both flights.

(c) An applicant who complies with paragraph (a) or paragraph (b) of this section, and meets all requirements for the issuance of a private pilot certificate, except the cross-country training requirements of §61.109 of this part, will be issued a pilot certificate with an endorsement containing the following limitation, "Passenger carrying prohibited on flights more than 10 nautical miles from (the appropriate island)." The limitation may be subsequently amended to include another island if the applicant complies with the requirements of paragraph (b) of this section for another island.

(d) Upon meeting the cross-country training requirements of §61.109 of this part, the applicant may have the limitation in paragraph (c) of this section removed.

§61.113 PRIVATE PILOT PRIVILEGES AND LIMITATIONS: PILOT IN COMMAND

(a) Except as provided in paragraphs (b) through (g) of this section, no person who holds a private pilot certificate may act as pilot in command of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as pilot in command of an aircraft.

(b) A private pilot may, for compensation or hire, act as pilot in command of an aircraft in connection with any business or employment if:
  (1) The flight is only incidental to that business or employment; and
  (2) The aircraft does not carry passengers or property for compensation or hire.

(c) A private pilot may not pay less than the pro rata share of the operating expenses of a flight with passengers, provided the expenses involve only fuel, oil, airport expenditures, or rental fees.

(d) A private pilot may act as pilot in command of an aircraft used in a passenger-carrying airlift sponsored by a charitable organization described in paragraph (d)(7) of this section, and for which the passengers make a donation to the organization, when the following requirements are met:
  (1) The sponsor of the airlift notifies the FAA Flight Standards District Office with jurisdiction over the area concerned at least 7 days before the event and furnishes–
    (i) A signed letter from the sponsor that shows the name of the sponsor, the purpose of the charitable event, the date and time of the event, and the location of the event; and
    (ii) A photocopy of each pilot in command's pilot certificate, medical certificate, and logbook entries that show the pilot is current in accordance with §§61.56 and 61.57 of this part and has logged at least 200 hours of flight time.
  (2) The flight is conducted from a public airport that is adequate for the aircraft to be used, or from another airport that has been approved by the FAA for the operation.
  (3) No aerobatic or formation flights are conducted.
  (4) Each aircraft used for the charitable event holds a standard airworthiness certificate.
  (5) Each aircraft used for the charitable event is airworthy and complies with the applicable requirements of Subpart E of Part 91 of this chapter.
  (6) Each flight for the charitable event is made during day VFR conditions.
  (7) The charitable organization is an organization identified as such by the U.S. Department of Treasury.

(e) A private pilot may be reimbursed for aircraft operating expenses that are directly related to search and location operations, provided the expenses involve only fuel, oil, airport expenditures, or rental fees, and the operation is sanctioned and under the direction and control of:
  (1) A local, State, or Federal agency; or
  (2) An organization that conducts search and location operations.

(f) A private pilot who is an aircraft salesman and who has at least 200 hours of logged flight time may demonstrate an aircraft in flight to a prospective buyer.

(g) A private pilot who meets the requirements of §61.69 of this part may act as pilot in command of an aircraft towing a glider.

§61.117 PRIVATE PILOT PRIVILEGES AND LIMITATIONS: SECOND IN COMMAND OF AIRCRAFT REQUIRING MORE THAN ONE PILOT

Except as provided in §61.113 of this part, no private pilot may, for compensation or hire, act as second in command of an aircraft that is type certificated for more than one pilot, nor may that pilot act as second in command of such an aircraft that is carrying passengers or property for compensation or hire.

Source: Summit Aviation's *Computerized Aviation Reference Library*-000301

Private Pilot Flight Training Task (Maneuvers and Procedures)
Airplane Single-Engine Checklist

• Preflight Preparation

- ☐ Certificates and Documents
- ☐ Weather Information
- ☐ Cross-Country Flight Planning
- ☐ National Airspace System
- ☐ Performance and Limitations
- ☐ Operation Of (Airplane) Systems
- ☐ Minimum Equipment List
- ☐ Aeromedical Factors

• Preflight Procedures

- ☐ Preflight (Visual) Inspection
- ☐ Cockpit Management
- ☐ Engine Starting
- ☐ Taxiing Procedures
- ☐ Takeoff Check, Before

• Airport Operations

- ☐ Radio Communications and ATC Light Signals
- ☐ Traffic Pattern Operations
- ☐ Airport and Runway Marking and Lighting

• Takeoffs, Landings, and Go-Arounds

- ☐ Normal Takeoff and Climb
- ☐ Crosswind Takeoff and Climb
- ☐ Normal Approach and Landing
- ☐ Crosswind Approach and Landing
- ☐ Soft-Field Takeoff and Climb
- ☐ Soft-Field Approach and Landing
- ☐ Short-Field Takeoff and Climb
- ☐ Short-Field Approach and Landing
- ☐ Slips To Landing (Forward)
- ☐ Go-Around - (Rejected) (Balked) (Aborted) Landing

• Performance Maneuvers

- ☐ Steep Turns

• Ground Reference Maneuvers

- ☐ Rectangular Course
- ☐ S-Turns
- ☐ Turns Around A Point

• Navigation

- ☐ Pilotage (Ground Features)
- ☐ Dead Reckoning (Computation)
- ☐ Navigation Systems and Radar Services
- ☐ Diversion To Alternate Airport
- ☐ Lost Procedures

• Slow Flight and Stalls

- ☐ Maneuvering During Slow Flight
- ☐ Spin Awareness
- ☐ Full Stalls—Power Off
- ☐ Full Stalls—Power On

• Basic Instrument Maneuvers

- ☐ Straight-and-Level Flight
- ☐ Constant Airspeed Climbs – Straight
- ☐ Constant Airspeed Descents – Straight
- ☐ Turns To Headings
- ☐ Unusual (Critical) Flight Attitudes, Recovery
- ☐ Radio Aids and Radar Services

• Emergency Operations

- ☐ Emergency Descent
- ☐ Emergency Approach and Landing (Simulated)
- ☐ Systems and Equipment Malfunctions
- ☐ Emergency Equipment and Survival Gear

• Night Operations

- ☐ Night Preparation
- ☐ Night Flight

• Postflight Procedures

- ☐ After Landing Procedures
- ☐ Parking and Securing Airplane

The following pilot applicant has received the above indicated aeronautical flight training, and the following CFI certifies that the pilot applicant was given the above indicated flight training and found competent to perform each pilot operation as a private pilot, and has endorsed the pilot's reliable record or logbook accordingly.

CFI - Signature - Date

Pilot Applicant - Signature - Date

DATE

Certificates and Documents

Preflight Preparation

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Pilot Certificate, Medical and Logbook .2
- ☐ Airplane Documents, Records and Logs .5
- ☐ CFR's Part 41, 61 and 91 .3
- ☐ FAA Reference Materials .4
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Maintenance Logs (Airframe and Engine)
- ☐ Aeronautical Information Manual (AIM)
- ☐ AC 60-6B, Airplane (AFM), Approved Manual Materials, Markings, and Placards

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to certificates and documents by explaining –
- (a) pilot certificate privileges and limitations.
- (b) medical certificates, class and duration.
- (c) pilot logbook or flight records.

☐ 2. Exhibits knowledge of the elements related to certificates and documents by locating and explaining –
- (a) airworthiness and registration certificates.
- (b) operating limitations, placards, instrument markings, handbooks, and manuals.
- (c) weight and balance data, and equipment list.
- (d) airworthiness directives, compliance records, maintenance requirements, tests, and appropriate records.

ELEMENTS

- ☐ 1. FAA–Approved Airplane Flight Manual
- ☐ 2. Airframe, engine, and propeller logs
- ☐ 3. Title 14 of the CFR, familiarity
- ☐ 4. Advisory Circulars (AC's), familiarity
- ☐ 5. Airworthiness Directives (AD's)
- ☐ 6. Preventive maintenance program
- ☐ 7. ARROWS (acronym) checklist
- ☐ 8. Maintenance performed by the pilot

COMMON ERRORS

- ☐ 1. Confused about medical expiration date
- ☐ 2. Misreading inspection records
- ☐ 3. Exceeds weight or balance criteria
- ☐ 4. Obsolete equipment list
- ☐ 5. Misreading airworthiness expiration date
- ☐ 6. Feels operating limitations complicated

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Explain pilot and medical certificates, (privileges, limitations, and durations), referent, CFR's.
- ☐ 3. Demonstrate correct pilot flight log maintenance, and posting flight time guidelines.
- ☐ 4. Familiarize pilot with the existence, location and correct utilization of: approved airplane flight manual, markings, and placards, maintenance inspections and appropriate records and weight and balance performance mandates.
- ☐ 5. Stress the importance of adherence to all limitations and restrictions for both the pilot and airplane, and taking responsibility for keeping abreast of all proper amendments or changes.
- ☐ 6. Direct pilot to read and study all of the listed reference materials.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Become acquainted with all the above specified documents. Participates in the examination and review of each item and subject specified in the above objective.
- ☐ 3. Study and comprehend all available materials, e.g. advisory circulars etc.; and the application and pertinence of each subject item, including limitations and durations.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the location, validation, and durations of the above mentioned documents required to be on the pilot's person, or on board the airplane.
- ☐ 2. Pilot has located, and understands pertinent regulations in the CFR's.
- ☐ 3. Pilot has explained the significance of airworthiness, maintenance requirements, and operating limitations, and is thoroughly familiar with all available reference material.
- ☐ 4. Pilot has demonstrated competence by completing a short written test, and calculating the shifting of payload, and resolving weight and balance problems accurately.

REFERENCES

CFR-Part 43.9	Preventive Maintenance Records, Appendix A (c)
CFR-Part 61	Certification Pilots and Flight Instructors
CFR-Part 91	General Operating and Flight Rules
AC 61-21A	Flight Training Handbook
AFM	Approved Airplane Flight Manual
AC 91-67	Minimum Equipment Requirements For General Aviation Operations Under CFR 91
AC 00-2.7	Advisory Circular Checklist
AC 00-44EE	Status Of Federal Aviation Regulations
AC 39-7B	Airworthiness Directives
AC 45-2	Identification and Registration Marking
AC 61-98A	Currency and Additional Qualifications Requirements For Certificated Pilots
AC 61-9B	Pilot Transition Courses For Complex Single-Engine and Light Twin-Engine Airplanes

DATE

Weather Information

Preflight Preparation

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Weather Sources	.1
☐ Obtaining Weather Briefing	.3
☐ Interpretation and Analyzation	.5
☐ Flight Decisions (Pilot Judgment)	.2
☐ Critique and Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ ICAO METAR/TAF Code Format
- ☐ Weather Briefing Form(s)
- ☐ Telephone 800-WX-BRIEF
- ☐ Computer and Modem (DUATS)
- ☐ Weather Information Recording Form
- ☐ CFR 91.103, 91.155

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to weather information from various sources with emphasis on –
- (a) PIREP's.
- (b) SIGMET's and AIRMET's.
- (c) wind shear reports.

☐ 2. Makes a competent "go/no-go" decision based on available weather information.

ELEMENTS

- ☐ 1. Winds aloft forecast vs. planned altitude
- ☐ 2. Temperature/dew point spread (fog)
- ☐ 3. Adverse weather and severity of system
- ☐ 4. Closest VMC or IMC weather conditions
- ☐ 5. Weather data and information sources
- ☐ 6. Judgment go/no-go decision emphasized
- ☐ 7. Weather briefing procedures
- ☐ 8. Weather briefing phraseology
- ☐ 9. Freezing levels and ice PIREP's
- ☐ 10. Information interpretation and analysis
- ☐ 11. En route weather delays reported
- ☐ 12. Runway braking action conditions

COMMON ERRORS

- ☐ 1. Failed to get briefing – relied on visual skills
- ☐ 2. No NOTAM information obtained
- ☐ 3. Relied on memory, no written notes
- ☐ 4. Weather en route updating inadequate
- ☐ 5. Accepted incomplete weather briefing
- ☐ 6. Inclement weather forecast ignored
- ☐ 7. Misinterpreted METAR/TAF code format
- ☐ 8. Judgment based on faulty interpretations

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 3. Direct pilot to read the sections "Surface Aviation Weather Reports" and "Aviation Weather Forecasts" in AC 00-45D, Aviation Weather Services, Revised 1995.
- ☐ 4. Introduce and acquaint pilot with all weather information sources.
- ☐ 5. Furnish pilot with a Flight Planner Form, and completion demonstration and instructions.
- ☐ 6. Provide a thorough review and explanation of the METAR/TAF/SPECI weather code format.
- ☐ 7. Demonstrate obtaining and recording a complete pre-flight weather briefing, which would include: weather synopsis, adverse conditions, current weather METAR's, en route forecast, destination TAF's (Aerodrome Forecast), winds aloft, SIGMET's, AIRMET's, NOTAM's, PIREP's, and trends.
- ☐ 8. Explain and discuss weather data, interpretations and analyzations.
- ☐ 9. Critique pilot on judgment factors and Pilot-In-Command (PIC) responsibility for all flight decisions.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Become acquainted with all the above sources of weather information available for preflight planning, and en route updating of current weather systems and destination conditions.
- ☐ 3. Participate in the examination and review of data, charts, reports, etc., and flight decisions.
- ☐ 4. Study and comprehend the application and pertinence of the following reports Automated Surface Observing System (ASOS), Automated Weather Observing System (AWOS), Aviation Routine Weather Report (METAR), and Terminal Aerodrome Forecast (TAF), including frequency of issuance of weather reports, and effects on airplane performance, route planning, and go/no-go decisions.

COMPLETION STANDARDS

- ☐ 1. Pilot has exhibited knowledge of aviation weather information by obtaining, reading, and analyzing all of the above items noted in the objective.
- ☐ 2. Pilot has made a competent go/no-go decision for each flight, based on the current and forecasted weather reports, type of aircraft and equipment, personal flying ability and experience, physical limitations, and decided if the flight should be delayed, postponed or canceled.

REFERENCES

AC 00-6A	Aviation Weather	AC 61-84B	Role of Preflight Preparation
AC 00-45D	Aviation Weather Services	AC 00-24B	Thunderstorms
AC 61-21A	Flight Training Handbook	AC 00-30	Rules for Avoiding Clear Air Turbulence
AC 61-107	Operations Of Aircraft At Altitudes Above Ft 250 MSL and/Or Mach Greater Than .75	IEOG	Weather, The Low Level Prognostic Chart
		FAA P-8740-30	How To Obtain A Good Weather Briefing

DATE

Cross–Country Flight Planning

Preflight Preparation

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Legal Requirements	.3
☐ Weather Briefing and NOTAMS	.5
☐ Airplane Data and Weight and Balance	1.0
☐ Navigation Log and Flight Plan	.5
☐ Pilot Application and Practice	1.0
☐ Critique and Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Aeronautical Charts (Current)
- ☐ Aeronautical Information Manual (AIM)
- ☐ Navigation Computer, Plotter and Flashlight
- ☐ Weather Reports, Flight Briefing, NOTAMS
- ☐ Flight Plan Form, Navigation Log
- ☐ Title 14 of the Code of Federal Regulations (CFR)

OBJECTIVE

The FAA requires that the pilot applicant:

1. ☐ Exhibits knowledge of the elements related to cross country flight by presenting and explaining a pre–planned VFR cross–country flight, as previously assigned by the examiner. It shall be planned using real time weather to the first fuel stop. Computations shall be based on maximum passenger, baggage and/or cargo loads.
2. ☐ Uses appropriate, current aeronautical charts.
3. ☐ Properly identifies airspace, obstructions, and terrain features.
4. ☐ Selects easily identifiable en route checkpoints.
5. ☐ Selects most favorable altitudes or flight levels, considering weather conditions and equipment capabilities.
6. ☐ Computes headings, flight time, and fuel requirements.
7. ☐ Selects appropriate navigation facilities and communication frequencies.
8. ☐ Extracts and records pertinent information from NOTAM's, Airport Facility Directory, and other flight publications.
9. ☐ Completes a navigation log and simulates filing a VFR flight plan.

ELEMENTS

- ☐ 1. Performance limitations awareness
- ☐ 2. Procuring all appropriate equipment
- ☐ 3. Flight plan (VFR) preparation and filing
- ☐ 4. Route(s) selection and plotting accuracy
- ☐ 5. Navigation log thoroughly prepared
- ☐ 6. Weight and balance/equipment list check
- ☐ 7. Weather briefing, and en route updating
- ☐ 8. Night preflight preparation and planning

COMMON ERRORS

- ☐ 1. Performance data misinterpreted
- ☐ 2. Fuel reserve computation erroneous
- ☐ 3. Weather briefing fragmentary or ignored
- ☐ 4. Navigation log incomplete or impractical
- ☐ 5. Airspace classifications disregarded
- ☐ 6. NOTAM's, failed to obtain current data
- ☐ 7. Aeronautical charts used were expired
- ☐ 8. Airport Facility Directory not utilized

INSTRUCTOR'S ACTIONS

1. ☐ Explain and discuss the lesson objective, and the required performance acceptance criteria.
2. ☐ Inform pilot that CFR's require each PIC become familiar with "all" available information concerning proposed flight. Review all the various sources of aeronautical information.
3. ☐ Direct pilot to read the section "Cross–Country Flying" in AC 61-21A.
4. ☐ Describe how to search for relevant data to be utilized by the pilot to establish the following: VFR weather conditions at departure, en route, destination, alternate; NOTAMs, wind, temperature, density altitude, takeoff distance, current chart selection, routes, (destination and alternate), check points, proposed altitude, WCA, magnetic courses, distances, TAS, GS, ETE, ETA, communications/navigation frequencies, airport facilities data, landing performance, flight and reserve fuel required, and weight and balance within engineered limits.
5. ☐ Demonstrate how to complete navigation log, flight plan, and filing procedures.

PILOT'S ACTIONS

1. ☐ Participate in discussion of objective, listen, take notes, ask and solve questions.
2. ☐ Read the section "Cross–Country Flying" in AC 61-21A.
3. ☐ Practice flight planning skills to achieve competent execution of the objective.

COMPLETION STANDARDS

1. ☐ Pilot has demonstrated the ability to explain and plan a cross–country flight near the maximum range of the most complex airplane used for the practical flight test, including the preparation and completion of a navigation log and flight plan, as directed, while adhering to all objective criteria with accuracy and rational judgment.

REFERENCES

AC 61-21A	Flight Training Handbook (165)	CFR	Part 91.103, 91.151, 91.159
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	AFD	Airport Facility Directory
AC 61-84B	Role of Preflight Preparation	AC 00-45	Aviation Weather Services
AC 91-23	Pilot's Weight and Balance Handbook	AC 91-83B	Cancelling Or Closing Flight Plans

DATE

National Airspace System

Preflight Preparation

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Present and Explain National Airspace System .5
- ☐ CFI Demonstrate .5
- ☐ Pilot Application, Trial and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aeronautical Information Manual (AIM)
- ☐ Pilot's Logbook and/or Flight Record
- ☐ VFR Terminal Area Aeronautical Chart(s)
- ☐ VFR Sectional Aeronautical Chart(s)

OBJECTIVE

The FAA requires that the pilot applicant exhibits knowledge of the elements related to the National Airspace System by explaining:

☐ 1. Basic VFR Weather Minimums – for all class of airspace.

☐ 2. Airspace classes – their boundaries, pilot certification and airplane equipment requirements for the following –

(a) Class A,
(b) Class B,
(c) Class C,
(d) Class D,
(e) Class E, and,
(f) Class G.

☐ 3. Special use airspace and other airspace areas.

ELEMENTS

- ☐ 1. International civil aviation organization
- ☐ 2. Aeronautical charting conventions or symbols
- ☐ 3. Weather requirements vs. airspace class
- ☐ 4. Transponder Mode-C area(s)
- ☐ 5. Airspace parameters
- ☐ 6. Special use airspace (SUA)
- ☐ 7. Pilot requirements vs. airspace classification
- ☐ 8. Airplane airspeeds
- ☐ 9. Student pilot training for Class B airspace
- ☐ 10. Airspace controlling agencies

COMMON ERRORS

- ☐ 1. Position and airspace awareness inaccurate
- ☐ 2. VFR aeronautical chart(s) expired
- ☐ 3. Mode-C operation area disregarded
- ☐ 4. Special use airspace (SUA) misconstrued

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the chapter on "Airspace" in the AIM, and CFR part 71.
- ☐ 3. Demonstrate and explain basic VFR (VFR 3SM/1000' ceiling) and SVFR weather minimums. No VFR in class A; Class B is 3SM visibility and clear of clouds; Class C, D, and E is 3SM visibility and 500' below and 1000' above and 2000' horizontal from clouds, below 10,000' MSL. At or above 10,000' MSL it is 5SM visibility and 1,000' below and 1,000' above and 1SM horizontal from clouds. Review the altitude levels and day and night weather minimums for class G airspace.
- ☐ 4. Demonstrate and explain the VFR navigation chart symbology, used to depict the various airspace classification boundaries, and perimeters including the pilot requirements, and airplane equipment.
- ☐ 5. Review the graphics used to distinguish the classes of airspace, such as solid blue circular lines for class B, solid magenta circular lines for class C, blue segmented circular lines for class D, and magenta segmented circular lines for class E, also review the required Mode-C operation areas.
- ☐ 6. Explain airspace memory aid; A is for Altitude (anything above FL 180); B is for Big (big airplanes); C is for Crowded or congested airports; D is for Dialogue (areas where you have to talk to controllers); E is for Elsewhere (any other controlled airspace, such as transition areas and airways); G is for Go for it (uncontrolled airspace). Review and explain MTR's, such as IR's and VR's.
- ☐ 7. Demonstrate and explain each of the SUA's, such as prohibited area, restricted area, warning area, military operations areas (MOA), alert area, and controlled firing areas (CFA) on the charts.
- ☐ 8. Conduct a lesson critique, to insure objective comprehension, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read and comprehend the chapter "Airspace" in the AIM, and CFR part 71.
- ☐ 3. Study the basic VFR weather minimum as published in the CFR's.
- ☐ 4. Study the VFR aeronautical chart(s) legend(s) specifically the airport traffic service and airspace information, including all the color and graphical depiction of airports and classes of airspace.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the basic VFR weather minimums for each of the classes and types of airspace for both day and night including SVFR weather requirements.
- ☐ 2. Pilot has located each airspace class, and all SUA's on the VFR aeronautical chart(s), and determined their boundaries, pilot certification, and airplane equipment requirements accurately.

REFERENCES

CFR Part 61, and Part 91 | VFR-CUG Visual Flight Rules Chart User's Guide (NOAA)

DATE

Performance and Limitations

Preflight Preparation

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Present Performance Data and Location .5
- ☐ Demonstrate Weight and Balance .5
- ☐ Pilot Application, Trial and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Equipment List
- ☐ Aircraft Weight and Balance Data
- ☐ Aircraft Markings and Placards
- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ Model Airplane Or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to performance and limitations by explaining the use of charts, tables, and data to determine performance and the adverse effects of exceeding limitations.

☐ 2. Computes weight and balance, including adding, removing, and shifting weight. Determines if the weight and center of gravity will remain within limits during all phases of flight.

☐ 3. Describes the effects of various atmospheric conditions on the airplane's performance.

☐ 4. Determines whether the computed performance is within the airplane's capabilities and operating limitations.

ELEMENTS

- ☐ 1. Airplane's specifications awareness
- ☐ 2. AFM and/or POH, frequent utilization
- ☐ 3. Weather versus airplane performance
- ☐ 4. Forward C.G. critical on landing
- ☐ 5. Aft C.G. critical in a stall
- ☐ 6. Performance charts and data application
- ☐ 7. Standard atmosphere
- ☐ 8. Density altitude determination
- ☐ 9. Crosswind component (demonstrated)
- ☐ 10. Climb gradient required vs. performance
- ☐ 11. Pilot analysis and judgment
- ☐ 12. Weight shifting vs. C.G. solutions

COMMON ERRORS

- ☐ 1. Impulsive decision practices
- ☐ 2. Defective conclusions and judgment
- ☐ 3. Atmospheric conditions ignored
- ☐ 4. Misinterpreted charts, tables, and/or data
- ☐ 5. Desired performance exceeds limitations
- ☐ 6. Weight and balance calculations wrong

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Inform pilot of the two principal reasons for weight and balance limits; 1. effect on structure and performance characteristics, and 2. that the location of the weight will adversely affect stall and spin recovery and flight stability. Explain the primary parts of performance, such as takeoff and landing distance, rate of climb, ceiling(s) (service and absolute), payload, range, speed, and stability. The use of performance data is mandatory for safe and efficient flight operation.
- ☐ 3. Explain the use of all performance tables, graphs, and charts in flight planning, including the effects of density altitude, (pressure altitude corrected for nonstandard temperature).
- ☐ 4. Assign weight and balance, (including shifting payload problems), and performance problems to pilot to calculate solutions and make flight recommendations.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Become acquainted with all the above specified documents. Participate in the examination and review of all tables, graphs, and charts, including weight and balance data.
- ☐ 3. Complete assigned performance problems, and make loading and flight decisions.

COMPLETION STANDARDS

- ☐ 1. Pilot can explain the serious consequences of failing to determine takeoff, climb, or landing performance for each flight, or exceeding the weight "or" balance during any phase of flight.
- ☐ 2. Pilot has completed weight and balance calculations accurately.
- ☐ 3. Pilot has determined airplane performance using the above criteria, and was able to make reasonable flight decisions based on the analysis of all available data for assigned airplane.
- ☐ 4. Pilot understands that the airplane performance is much better in cold dry air than in hot moist air, and low altitude versus high altitude.

REFERENCES

AC 61-21A	Flight Training Handbook (306)	CFR	Part 91.9, 91.103
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	AC 60-22	Aeronautical Decision Making
AC 91-23	Pilot's Weight and Balance Handbook	AC 91-13C	Cold Weather Operation of Aircraft
AC 61-84B	Role of Preflight Preparation	AC 120-27A	Aircraft Weight and Balance Control
AFM	Approved Airplane Flight Manual		

DATE

Operation of (Airplane) Systems

Preflight Preparation

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ CFI Explanation and Demonstration .3
- ☐ Pilot Rehearsing Systems Operations .5
- ☐ Pilot Critique and Review .3
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Equipment List
- ☐ Aircraft Weight and Balance Data
- ☐ Aircraft Markings and Placards (CFR 91.9)

OBJECTIVE

The FAA requires that the pilot applicant exhibits knowledge of the elements related to the appropriate normal operating procedures and limitations of the following systems by explaining:

- ☐ 1. Primary flight controls and trim.
- ☐ 2. Flaps, leading edge devices, and spoilers.
- ☐ 3. Powerplant.
- ☐ 4. Propeller.
- ☐ 5. Landing gear.
- ☐ 6. Fuel, oil, and hydraulic systems.
- ☐ 7. Electrical system.
- ☐ 8. Pitot-static system, vacuum/pressure system and associated flight instruments.
- ☐ 9. Environmental system.
- ☐ 10. Deicing and anti-icing systems.
- ☐ 11. Avionics systems.

ELEMENTS

- ☐ 1. Airplane systems information available
- ☐ 2. Placards and cautions, compliance
- ☐ 3. Operating directive, utilization/adherence
- ☐ 4. Avionics operating instructions
- ☐ 5. Checklist and systematic application
- ☐ 6. Maintenance requirements and validation

COMMON ERRORS

- ☐ 1. Relationship of system(s) to system(s) deficient
- ☐ 2. Recommended procedures ignored
- ☐ 3. Confused by data, charts and warnings
- ☐ 4. Checklist routine and/or item(s) bypassed
- ☐ 5. Locations of systems(s) SOP unknown
- ☐ 6. System(s) SOP functionality misunderstood
- ☐ 7. Used outdated Airplane Flight Manual (AFM)
- ☐ 8. Equipment list not accurate or updated

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Explain and acquaint pilot with the manufacturer's FAA-Approved Airplane Flight Manual (AFM), and/or Pilot's Operating Handbook (POH), and how these manuals should be utilized to insure familiarity with the airplane systems, functions, operation, use, and inspection schedules.
- ☐ 3. Demonstrate and explain the purpose and operational function (SOP) of each airplane component and system(s), installed and/or aboard the airplane. Insure that the pilot clearly understands that it is the pilot's responsibility to be thoroughly familiar with each particular airplane that is to be used for flight, including the SOP for components, and systems, and their relationship or dependency to other systems, e.g.: 1. Vacuum system failure to flight instruments, then to autopilot, 2. Static port failure effect on altimeter and transponder encoder, 3. Alternator system failure as to the battery voltage amp hour expectancy, 4. Airplane weight and C.G. location as to airplane performance, 5. Tire pressure effect on takeoff distance and or hydroplaning speed, etc.
- ☐ 4. Demonstrate and explain each control feature and operating function of all avionics and emphasize the accurate setting or programming of all navigational systems, i.e.: GPS, Loran, RNAV, etc.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Acquire comprehensive familiarity with the approved airplane flight manual and/or the manufacturer's pilot's operating handbook for the airplane, and the operating systems.
- ☐ 3. Practice using all the above specified systems and components of any airplane flown.
- ☐ 4. Study and comprehend the operation and function of each subject item, including testing, evaluating, and awareness of all the systems' constraints and/or limitations.
- ☐ 5. Participate in the examination and review, and application of every system and component.

COMPLETION STANDARDS

- ☐ 1. Pilot has located all systems and manufacturer's operating instructions.
- ☐ 2. Pilot has demonstrated a prerequisite insight of airplane structures, engine, and systems.
- ☐ 3. Pilot has located and explained the proper use, maintenance and limitations of all applicable airplane systems listed in the above objective for the airplane that was operated in flight.

REFERENCES

AC 61-21A	Flight Training Handbook (56)	AC 25-14	High Lift and Drag Devices
AC 61-84B	Role of Preflight Preparation	AC 43-203B	Altimeter and Static System Tests/Inspections
AFM	Approved Airplane Flight Manual	AC 91-51	Airplane Deice and Anti-Ice Systems
FAA P-8740-7	The Safe Pilot's 12 Golden Rules		

DATE

Minimum Equipment List

Preflight Preparation

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Explanation of Airworthiness Decision Process .5
- ☐ Title 14 Code of Federal Regulations (CFR) .2
- ☐ Oral Examination of Pilot .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Equipment List
- ☐ Aircraft Markings and Placards (CFR § 91.9)
- ☐ Sample Master Minimum Equipment List (MMEL)
- ☐ Sample FSDO Letter Of Authorization (LOA)

OBJECTIVE

The FAA requires that the pilot applicant exhibits knowledge of the elements related to the FAA-approved minimum equipment list by explaining:

- ☐ 1. Which aircraft require the use of a minimum equipment list.
- ☐ 2. Airworthiness limitations imposed on aircraft operations with inoperative instruments or equipment.
- ☐ 3. Requirements for a letter of authorization from the FAA Flight Standards District Office.
- ☐ 4. Supplemental type certificates.
- ☐ 5. Instrument and equipment exceptions.
- ☐ 6. Special flight permits.
- ☐ 7. Procedures for deferring maintenance on aircraft without an approved minimum equipment list.

ELEMENTS

- ☐ 1. Flight operation, MEL or CFR § 91.213(d)
- ☐ 2. Procedures for item removal or deactivation
- ☐ 3. Pilot go/no-go decision sequence process
- ☐ 4. MEL, precise list of legally inoperative items
- ☐ 5. LOA, stipulated flight operating conditions
- ☐ 6. Special flight permit(s), CFR § 21.197

COMMON ERRORS

- ☐ 1. Placard(s) fails to meet FAA specifications
- ☐ 2. Inoperative equipment not placarded
- ☐ 3. Placard(s) not in appropriate location(s)
- ☐ 4. MEL and LOA not on board airplane

INSTRUCTOR'S ACTIONS

NOTE: This is not a required PTS flight operation.

- ☐ 1. Instruct the pilot that the MEL is an acceptable method for operation of an airplane under Title 14 CFR Part 91, with certain inoperative instruments/equipment which are not essential for safe flight.
- ☐ 2. Direct pilot to read "Minimum Equipment Requirements For General Aviation Operations Under CFR Part 91", AC 91-67, and 14 CFR §§ 91.205, 91.213, and 91.405.
- ☐ 3. Minimum Equipment List (MEL) is an FAA approved inventory of specific equipment and/or instruments for a particular airplane identified by serial and registration number that may legally be inoperative, and permits operation of the airplane under specified conditions. When the FSDO issues a Letter Of Authorization (LOA) to operate under the provisions of an MEL, together the MEL and LOA constitute a Supplemental Type Certificate (STC) for that specific airplane.
- ☐ 4. Advise pilot that under CFR Part 91, if a pilot during preflight finds inoperative equipment, and in the absence of a STC or special flight permit, the pilot must then abide by the criteria set forth in CFR § 91.213(d), which involves an airplane airworthiness decision-making process in addition to removing or deactivating the inoperative item and placarding it according to CFR § 43.11.
- ☐ 5. Review and explain the purpose of each of the various documents that constitute an MEL; such as the Master Minimum Equipment List (MMEL), Preamble, Letter of Authorization (LOA), and O and M Procedures. Advise pilot that the MEL is an "option", not a requirement for CFR Part 91 operations.
- ☐ 6. Demonstrate and explain to the pilot the **proper sequence** of the airworthiness decision-making process when operating without an MEL and inoperative instruments/equipment are discovered on preflight inspection to ensure legal and safe go/no-go flight decision.

PILOT'S ACTIONS

- ☐ 1. Complete the reading assignment as well as the pertinent regulations regarding MEL's, special flight permits, and pilot or approved mechanic removal and/or deactivation of inoperative items.
- ☐ 2. Review all forms, documents, and records, including purpose and function of an approved MEL.
- ☐ 3. Practice removal of inoperative items pursuant to CFR § 91.213(d)(3)(i), and deactivated items pursuant to CFR § 91.213(d)(3)(ii), and the AFM.
- ☐ 4. Study the published pilot decision sequence process with and without an MEL, including the additional pilot work load, and capability of pilot in relationship to current experience level.

COMPLETION STANDARDS

- ☐ 1. Pilot exhibited comprehension and insight of the task elements by thoroughly explaining the MEL concept which permits flight operations with inoperative instrument/equipment that are not essential for safe flight, as an alternative to the more restrictive maintenance criteria of CFR § 91.213(d).

REFERENCES

AC 60-6B	Airplane Flight Manuals (AFM) - Approved Manual Materials, Markings, and Placards	FAA P-8740-15A	Under CFR Part 91 Maintenance Aspects Of Owning Your Own Airplane - Inspection Check List
AC 91-67	Minimum Equipment Requirements For General Aviation Operations		

DATE

Aeromedical Factors

Preflight Preparation

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Explanation of Aeromedical Factors .5
- ☐ Title 14 Code Of Federal Regulations CFR) .2
- ☐ Oral Examination of Pilot .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ Medical Handbook For Pilots AC 67-2
- ☐ Aeronautical Information Manual (AIM)

OBJECTIVE

The FAA requires that the pilot applicant exhibits knowledge of the elements related to aeromedical factors by explaining:

☐ 1. The symptoms, causes, effects, and corrective actions of at least four of the following –
- (a) hypoxia.
- (b) hyperventilation.
- (c) middle ear and sinus problems.
- (d) spatial disorientation.
- (e) motion sickness.
- (f) carbon monoxide poisoning.
- (g) stress and fatigue.

☐ 2. The effects of alcohol and drugs, including over-the-counter drugs.

☐ 3. The effects of nitrogen excesses during scuba dives upon a pilot and/or passenger in flight.

ELEMENTS

☐ 1. Pilot is only partly prepared for safe flight if not familiar with the medical factors which affect performance and judgment

☐ 2. Must be physically fit, and psychologically sound

☐ 3. No person with any known medical deficiency may act as PIC or crewmember

☐ 4. Familiarity with appropriate Title 14 of the Code of Federal Regulations (CFR) and Advisory Circulars is imperative for safe flight

☐ 5. IMSAFE (acronym) checklist
- I Illness
- M Medication
- S Stress
- A Alcohol
- F Fatigue
- E Emotions

☐ 6. Night vision versus supplemental oxygen

☐ 7. Carbon monoxide detector utilization

☐ 8. Fatigue versus pilot training activities

COMMON ERRORS

☐ 1. Aeromedical conditions are unfamiliar

☐ 2. Altitude effects, disregarded as serious

☐ 3. Night adaptation, impaired by bright light

☐ 4. Non-prescription drugs considered safe

☐ 5. Medical facts, inadequate understanding

☐ 6. Physical limits, pilot lacks awareness

INSTRUCTOR'S ACTIONS

☐ 1. Familiarize pilot with the existence of AC 67-2, Medical Handbook For Pilots, and the causes, symptoms and preventions for the above listed aeromedical conditions.

☐ 2. Advise pilot that adequate knowledge of the above aeromedical infirmities is vital to safe flight operations, and instruct pilot to avoid incidents known to cause or aggravate any of these disorders.

☐ 3. Inform pilot medical certificate is legally invalid during any period of illness that prevents performing flying duties properly.

PILOT'S ACTIONS

☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.

☐ 2. Study, review and comprehend the causes, symptoms and preventions for the above listed aeromedical conditions.

☐ 3. Acknowledge responsibility to consider the status of personal health and be informed on aeromedical facts.

☐ 4. Establish understanding by answering oral examination questions.

COMPLETION STANDARDS

☐ 1. Pilot has by oral examination explained the importance of medical fitness for flightcrew and the elements related to the above listed aeromedical ailments.

☐ 2. Pilot understands that any use of alcohol or drugs, in any amount, is first a violation of CFR's, and secondly, would dangerously impair pilot's performance.

☐ 3. Pilot is familiar with the section on medical facts for pilots located in the Aeronautical Information Manual, and is well informed regarding the subject of decompression sickness after scuba diving.

REFERENCES

CFR	61.23, 61.53, 91.17	FAA P-8740-41	Medical Facts For Pilots
AC 61-21A	Flight Training Handbook (6)	AC 60-4A	Pilot's Spatial Disorientation
AC 67-2	Medical Handbook For Pilots	AC 91-35	Noise Hearing Damage and Fatigue In General Aviation Pilots
AIM	Aeronautical Information Manual		

DATE _____ PILOT APPLICANT _____

Night Flight, Physiological Aspects Of

Practical Test Standards - Task Lesson Plan

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ CFI Demonstration and Explanation .3
- ☐ Pilot Application, Trial and Practice 1.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ VFR Aeronautical Charts (Current)
- ☐ Aeronautical Information Manual (AIM)
- ☐ Clipboard/Mapboard, and Flashlight (Red Lens)
- ☐ Electrical Fuses and Cockpit Bulbs, Spares

OBJECTIVE

The FAA requires that the pilot applicant exhibits knowledge of the elements related to the physiological aspects of night flying by explaining:

- ☐ 1. The function of various parts of the eye essential for night vision.
- ☐ 2. Adaptation of the eye to changing light.
- ☐ 3. Correct use of the eye to accommodate changing light.
- ☐ 4. Coping with illusions created by various light conditions.
- ☐ 5. Effects of the pilot's physical condition on visual acuity.
- ☐ 6. Methods for increasing vision effectiveness.

ELEMENTS

- ☐ 1. Construction and function of the eye parts
- ☐ 2. Autokinesis is cause of optical illusions
- ☐ 3. Off-center viewing technique
- ☐ 4. Eye adaptation time process
- ☐ 5. Red light will not impair night vision
- ☐ 6. Night vision vs. pilot fear or apprehension
- ☐ 7. Cockpit lights set at minimum brightness
- ☐ 8. PIC must safeguard night vision adaptation

COMMON ERRORS

- ☐ 1. Adaptation inadequate prior to night flight
- ☐ 2. Rapid eye movement and/or scanning
- ☐ 3. Off-center viewing technique ignored
- ☐ 4. Erroneous visual perceptions not verified
- ☐ 5. Inadvertent flight into IMC
- ☐ 6. Fatigue, uncertainty, and indecision

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Night Flying" in AC 61-21A, and in AC 67-2.
- ☐ 3. Explain to pilot the various parts of the eye, such as: pupils, cones, rods, optic nerve, and retina, and their function which make night vision possible after adequate low light adjustment.
- ☐ 4. Demonstrate and explain to the pilot that the cones (light sensitive nerves) which are used for light vision only become adapted to **sunlight in 10 seconds**, whereas the rods (used for peripheral day and night vision) need **30 minutes to fully adjust to a dark night**, but when they become adjusted the rods are about 100,000 times more sensitive to light than they were in daylight, also that the night adaptation can be lost a few seconds if exposed to bright light.
- ☐ 5. Advise pilot that the correct way to use eyes at night is not to stare at a pinpoint of light, but rather keep eyes moving (scanning) and view object or target with the "off-center" viewing technique.
- ☐ 6. Caution pilot regarding the insidious potential of visual illusions, vertigo, or "after images" that may result from temporary blindness caused by bright light, or staring at small spots of light, and/or inadequate oxygen for night vision at an altitude as low as 5000' MSL. Pilot must confirm all visual perceptions with accurate interpretations of flight instruments prior to making control adjustments.
- ☐ 7. Advise pilot that good eyesight depends upon physical condition. Fatigue, colds, vitamin deficiency, alcohol, stimulants, smoking, or medication can **seriously impair visual acuity**, (sharp focus).

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Night Flying" in AC 61-21A, and in AC 67-2.
- ☐ 3. Study the diagrams of the eye and the various parts, and make notes as to just how each part reacts to light or the absence thereof, and the time necessary for the eyes to adapt to the darkness.
- ☐ 4. Practice adapting eyes to the dark or very low light levels and employing the off-center scanning or viewing techniques to identify objects or targets.
- ☐ 5. Experiment using a clear lens flashlight versus a red lens to read a chart in a dark area, and experience the optical illusions or after images caused by the bright light.

COMPLETION STANDARDS

- ☐ 1. Pilot has thoroughly explained the functions of each part of the eye, and the adaptation time process, as well as the fact that visual illusions can occur by exposure to bright light, or rapid eye movement, and/or staring at an object or target.
- ☐ 2. Pilot has explained methods to increase night vision effectiveness, such as keeping physically fit, abstaining from drugs, smoking, and alcohol. Pilot explained the need for protecting against any bright lights after adaptation, scanning slowly, and employing the off-center viewing techniques.

REFERENCES

AC 61-21A Flight Training Handbook (193) | AC 67-2 Medical Handbook For Pilots

DATE

Night Flight, Lighting and Equipment For

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.1
☐ CFI Demonstration and Explanation	.5
☐ Pilot Application, Trial and Practice	1.5
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ VFR Aeronautical Charts (Current)
- ☐ Aeronautical Information Manual (AIM)
- ☐ Clipboard/Mapboard, and Flashlight (Red Lens)
- ☐ Electrical Fuses and Cockpit Bulbs, Spares

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to lighting and equipment for night flying by explaining –
- (a) the types and uses of various personal lighting devices.
- (b) the required equipment, additional equipment recommended, and location of external navigation lighting of the airplane.
- (c) the meaning of various airport and navigation lights, the method of determining their status, and the procedure for airborne activation of runway lights.

☐ 2. Locates and identifies switches, spare fuses, circuit breakers pertinent to night operations.

ELEMENTS

- ☐ 1. Aircraft electrical system familiarity
- ☐ 2. Aircraft light systems and operation
- ☐ 3. Airport light control
- ☐ 4. Airport rotating beacon
- ☐ 5. Approach light control (ATCT or FSS)
- ☐ 6. Approach light system (ALS)
- ☐ 7. ATC traffic control light signals
- ☐ 8. Course lights
- ☐ 9. Flashlight and extra batteries
- ☐ 10. High intensity runway lights (HIRL)
- ☐ 11. In-runway lighting
- ☐ 12. Lead-in lights
- ☐ 13. Low intensity runway lights (LIRL)
- ☐ 14. Medium intensity runway lights (MIRL)
- ☐ 15. Obstruction lights
- ☐ 16. Operation lights on safety program
- ☐ 17. Pilot control of airport lights
- ☐ 18. Runway centerline lights
- ☐ 19. Runway edge lights
- ☐ 20. Runway end identifier lights (REIL)
- ☐ 21. Runway remaining lights
- ☐ 22. Sequenced flashing light system(s) (SFL)
- ☐ 23. Taxiway turnoff lights
- ☐ 24. Touchdown zone lighting (TZL)
- ☐ 25. Traffic control light signals
- ☐ 26. Visual approach light system(s) (VASI etc.)

COMMON ERRORS

- ☐ 1. Airport Facility Directory not utilized
- ☐ 2. NOTAM's, failed to obtain current data
- ☐ 3. Aeronautical chart legend not utilized
- ☐ 4. Electric system and switches, unfamiliar

INSTRUCTOR'S ACTIONS

- ☐ 1. Direct pilot to read and/or study the following; "Airport Lighting Aids" section in the AIM, Instruments and Equipment Requirements in CFR § 91.205, "Lighting Codes" for airport(s) of intended use in Airport Facility Directory, and "Electrical System" including schematic in AFM.
- ☐ 2. Demonstrate and explain the recommended equipment pilot should have, such as flashlight with red/white lens and extra batteries and bulbs, accurate clock, and a mapboard, readily available.
- ☐ 3. AFM, review and explain the complete electrical system including the following: location and function of all switches, spare fuses and bulbs, circuit breakers pertinent to night operation.
- ☐ 4. Demonstrate and explain the purpose of each of the light systems listed above and how they are indicated on charts and/or by light codes in the AFD, and determine their status in NOTAM(L)'s.
- ☐ 5. Conduct a lesson critique, and question and answer period. Preview next flight lesson.

PILOT'S ACTIONS

- ☐ 1. Complete the above reading assignment, and locate all of the various lighting systems for airports of intended use in the AFD, VFR charts and check NOTAM's for any inoperative lighting systems.
- ☐ 2. Make a thorough inspection of the airplane and its electrical system, including location of fuses, circuit breakers, and internal lights. Operate all switches so as to understand their operation.
- ☐ 3. Obtain essential personal equipment such as mapboard, flashlight, and accurate clock or watch.

COMPLETION STANDARDS

- ☐ 1. Pilot has thoroughly explained the necessity of the required and personal equipment for night operations, and the methods of determining the availability or status of each of the above light systems.
- ☐ 2. Pilot demonstrated understanding of operating in the darkness by properly locating essential personal items such as flashlight, clock, and mapboard so that they were readily available during flight.
- ☐ 3. Pilot has properly and successfully activated runway lights while airborne.

REFERENCES

AC 61-21A	Flight Training Handbook (193)	CFR	61.57 (d), 61.129, 91.209, 91.205
AIM	Aeronautical Information Manual	AFD	Airport Facility Directory

DATE

Preflight (Visual) Inspection

Preflight Procedures

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Demonstrate Airplane Checklist Use .7
- ☐ Explanation of Checklist Items .4
- ☐ Pilot Application, Trial and Practice .7
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Equipment List
- ☐ Aircraft Inspection Chart and Checklist
- ☐ Aircraft Markings and Placards
- ☐ Model Airplane Or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to a preflight inspection including which items must be inspected, for what reason, and how to detect possible defects.
- ☐ 2. Inspects the airplane by systematically following a prescribed checklist.
- ☐ 3. Verifies that the airplane is in condition for safe flight, notes any discrepancy, and accurately judges whether the airplane requires maintenance.

ELEMENTS

- ☐ 1. Emphasize use of checklist/procedures
- ☐ 2. Airworthiness status, make determination
- ☐ 3. Habitual and reliable airplane inspections
- ☐ 4. Night flight items, special consideration
- ☐ 5. A & P mechanic as a valuable resource
- ☐ 6. Fuel type and quantity visually determined
- ☐ 7. Oil type and quantity visually verified
- ☐ 8. Competent judgment, go/no-go decision

COMMON ERRORS

- ☐ 1. Checklist and/or item(s) bypassed
- ☐ 2. Static port not checked for obstruction
- ☐ 3. Navigation and landing lights not checked
- ☐ 4. Allowed distraction to interrupt inspection
- ☐ 5. Control locks and/or gear chocks ignored
- ☐ 6. Baggage weight and restraints not verified
- ☐ 7. External control locks, failed to remove
- ☐ 8. Inability to recognize discrepancies
- ☐ 9. Proper fuel and/or oil servicing not verified
- ☐ 10. Stall warning system operation not verified
- ☐ 11. Movement of propeller blade(s) unnoticed
- ☐ 12. Foreign debris in wheel wells not removed
- ☐ 13. Oleo shock absorber improperly inflated
- ☐ 14. Tire wear and/or improper pressure ignored

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the chapter "Visual Inspection of the Airplane" in AC 61-21A, and the AFM.
- ☐ 3. Inform pilot that no distractions should be permitted during visual inspection, and that the airworthiness of the airplane is both a legal obligation and a direct responsibility of the PIC.
- ☐ 4. Demonstrate and explain the fundamental procedures and techniques that are to be used to complete an uninterrupted systematic preflight inspection, while adhering to the SOP published in the AFM that must be employed to insure a factual basis for a qualified determination of the airworthiness status of the airplane, with special emphasis placed on the complex airplane components, such as: retractable landing gear, flaps, and controllable pitch propeller, and related controls.
- ☐ 5. Explain the reason for checking each item on the manufacturer's approved checklist, in the AFM.
- ☐ 6. Advise pilot if any apparent defects or discrepancies are discovered, or any doubt exists regarding the airworthiness, a certificated mechanic, approved repair station, or a local FAA airworthiness inspector should be consulted prior to any flight. Note any discrepancies in the appropriate logs.
- ☐ 7. Conduct a lesson critique, and question and answer period. Preview next flight lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Complete the above reading assignment and read the below listed references.
- ☐ 3. Become familiar with airplane by making a complete visual inspection with CFI, and examining each item on the manufacturer's recommended inspection checklist, and note reason for inspection.
- ☐ 4. Request further explanation for any procedure or technique not completely comprehended.
- ☐ 5. Establish understanding by answering oral examination questions.

COMPLETION STANDARDS

- ☐ 1. Pilot has used the manufacturer's recommended inspection checklist, has located each component or item and explained the specific reason for the examination.
- ☐ 2. Pilot understands that a certificated mechanic will be consulted, if in doubt, about **any** item.
- ☐ 3. Pilot has made determinations regarding the airworthiness of the airplane.

REFERENCES

AC 61-21A	Flight Training Handbook (48)
AFM	Approved Airplane Flight Manual
POH	Pilot's Operating Handbook
CFR	Federal Aviation Regulations
AC 20-119	Fuel Drain Valves
AC 20-125	Water in Aviation Fuels
AC 25-783-1	Fuselage Doors, Hatches, and Exits
AC 25-963-1	Fuel Tank Access Covers
AC 91-33-A	Use of Alternate Grades Of Aviation Gasoline For Grade 80/87
AC 91-59	Inspection and Care of General Aviation Aircraft Exhaust Systems

DATE

Cockpit Management

Preflight Procedures

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Safety, Efficiency, and Management .2
- ☐ Safety Belts, Seats, and Rudder Pedals .2
- ☐ Pilot Application, Trial and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Pilot Clip/Lapboard
- ☐ Aeronautical Charts (Current)
- ☐ Title 14 of the Code of Federal Regulations (CFR)

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to efficient cockpit management procedures, and related safety factors.
- ☐ 2. Organizes and arranges material and equipment in a manner that makes the items readily available.
- ☐ 3. Briefs or causes the briefing of occupants on the use of safety belts and emergency procedures.
- ☐ 4. If, applicable, briefs crew appropriately.
- ☐ 5. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Emphasize use of checklist procedures
- ☐ 2. Determine airplane's airworthy status
- ☐ 3. Habitual and reliable airplane inspection
- ☐ 4. Night flight items special consideration
- ☐ 5. Certificates and documents aboard
- ☐ 6. Cockpit equipment readily available
- ☐ 7. Aeronautical charts current and available
- ☐ 8. Emergency checklist current and available

COMMON ERRORS

- ☐ 1. Equipment and materials, failed to secure
- ☐ 2. Materials not available for easy access
- ☐ 3. Flight progress, failed to maintain record
- ☐ 4. Control and equipment not adjusted
- ☐ 5. Flashlight forgotten and/or dead batteries
- ☐ 6. Checklist and/or item(s) bypassed
- ☐ 7. Equipment or controls poorly adjusted
- ☐ 8. Passenger briefing was ignored

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required techniques and procedures.
- ☐ 2. Use checklist to determine that all material and equipment are aboard airplane.
- ☐ 3. Demonstrate and simultaneously explain the arranging and securing of all required items in a manner that makes them readily available to the pilot in flight.
- ☐ 4. Demonstrate and simultaneously explain the proper use and/or safe adjustment of rudder pedals, pilot seat, safety belts and shoulder harnesses to ensure good comfort and visibility, and full movement of the flight controls.
- ☐ 5. Advise pilot to check for loose articles in cockpit and ensure cockpit visibility.
- ☐ 6. Demonstrate by representative example, the habit of "good housekeeping".
- ☐ 7. Demonstrate proper procedure for passenger safety information briefing.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Become familiar with techniques and procedures used to manage cockpit items, equipment and duties, including the use of manufacturer's checklist, and recorded flight progress.
- ☐ 3. Demonstrate the habit of briefing the passengers on the use of safety belts and emergency procedures.
- ☐ 4. Read the section "Cockpit Management" in AC 61-21A.
- ☐ 5. Practice the proper and safe adjustment of rudder pedals and pilot seat to ensure good comfort and visibility and full movement of the flight controls.

COMPLETION STANDARDS

- ☐ 1. Before each flight pilot adjusted and locked the rudder pedals, pilot's seat and shoulder harness to insure comfort and ease of full control movement and adequate visibility.
- ☐ 2. Pilot realized that safe flying really begins on the ground.
- ☐ 3. Pilot has formed the habit of using a checklist to complete the cockpit duties while employing techniques and procedures for proper organization and efficient utilization of required materials to avoid apprehension and insure safety.

REFERENCES

AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	AC 91-65	Use Of Shoulder Harness In Passenger Seats
AC 61-21A	Flight Training Handbook (49)	AC 91-62	Use Of Child/Infant Seats In Aircraft
CFR	91.105, 91.107	AC 135-12A	Passenger Safety Information Briefing and Briefing Cards
AC 20-133	Cockpit Noise and Speech Interference Between Crewmembers		

DATE

Engine Starting

Preflight Procedures

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.1
☐ Safety Precautions	.2
☐ Pilot's Use of Electric Starter	.2
☐ Hand Propping Airplane	.2
☐ Pilot Application, Trial and Practice	.5
☐ Critique and Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ Manufacturer's Recommended Checklist
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Auxiliary Power Unit (APU) and Instructions
- ☐ Airport Facility Directory

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to correct engine starting procedures, including the use of an external power source, starting under various atmospheric conditions, awareness of other persons and property during start, and the effects of using incorrect starting procedures.

☐ 2. Accomplishes correct starting procedures.

☐ 3. Completes the prescribed checklists.

ELEMENTS

- ☐ 1. Safety precautions, emphasize
- ☐ 2. Hand propping, procedures and dangers
- ☐ 3. Engine starting procedure familiarity
- ☐ 4. Propeller and propeller blast area, clear
- ☐ 5. Over priming vs. fire hazards
- ☐ 6. Position lights, turn on before starting
- ☐ 7. Checklist and procedures, reiterate
- ☐ 8. Cold weather starting procedures
- ☐ 9. Propeller Control and RPM Gauge
- ☐ 10. Throttle Control & Manifold Pressure Gauge

COMMON ERRORS

- ☐ 1. Checklist and/or item(s) bypassed
- ☐ 2. Oil pressure not checked immediately
- ☐ 3. Engine RPM operated excessively high
- ☐ 4. Propeller area not properly cleared
- ☐ 5. Engine preheat improperly applied
- ☐ 6. Engine priming excessive and hazardous
- ☐ 7. Brakes not properly checked or utilized
- ☐ 8. Airplane positioning unsafe or improper
- ☐ 9. Throttle and RPM Control Sequence Ignored
- ☐ 10. APU was utilized with electrical system on

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read "Starting the Engine" in AC 61-21A, Flight Training Handbook, and the AFM.
- ☐ 3. Demonstrate positioning airplane in a safe area to insure that persons and property will not be struck by propeller blast or the debris from the ground, and set brakes. Insure that pilot has completed a thorough preflight inspection and that fuel and oil are of correct grade and quantity.
- ☐ 4. Demonstrate starting the engine using the AFM SOP and checklist, including the specific instructions for the given atmospheric conditions at the time. Check all engine gauges for normal indication, and advise pilot if the oil pressure is not "in the green" within 30/60 seconds, shut down engine.
- ☐ 5. Demonstrate starting the engine using an Auxiliary Power Unit (APU) while following the AFM SOP and checklist. Insure that the pilot understands the battery switch position, and safety precautions.
- ☐ 6. Advise pilot on cold weather and high density altitude engine starting procedures.
- ☐ 7. Caution pilot, due to the multitude of different engines and propellers, that only the manufacturer's recommended procedures and checklist for the specific airplane being flown should be utilized.
- ☐ 8. Demonstration of "Hand Propping" of the engine will only be performed with a third qualified pilot thoroughly familiar with all controls, seated in the tiedown airplane with break set - PERIOD.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the section "Starting the Engine" in AC 61-21A, Flight Training Handbook, and the AFM.
- ☐ 3. Position the airplane and completed the "Before Starting Engine" checklist in the AFM.
- ☐ 4. Practice engine starting procedures as directed by the AFM SOP and checklist including external power starts, while adhering to all safety precautions and the lesson objective criteria.
- ☐ 5. Participate in the oral examination and review of engine starting procedures.

COMPLETION STANDARDS

- ☐ 1. Pilot has formed the habit of using manufacturer's recommended engine starting checklist for the particular airplane being used while using due diligence, and the necessary safety precautions.
- ☐ 2. Pilot explained how to use different starting techniques and procedures depending on the various atmospheric conditions, and the relationship to climates and engine starting performance.
- ☐ 3. Pilot demonstrated the strict habit of using appropriate safety precautions before starting engine.

REFERENCES

AC 61-21A	Flight Training Handbook (SO)	AC 91-55	Reduction of Electrical Systems Failure Following Engine Starting
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	CFR	91.13
AC 91-13C	Cold Weather Operation of Aircraft	FAA P-8740-13	Engine Operation For Pilots

DATE

Taxiing

Preflight Procedures

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Demonstration of Lesson Elements .2
- ☐ Demonstration of Taxi Procedures .3
- ☐ Directed Pilot Application and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ Aeronautical Information Manual
- ☐ Airport Facility Directory
- ☐ Airport Runway and Taxi Diagram
- ☐ Federal Aviation Regulations 91.13
- ☐ Model Airplane Or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to recommended taxi procedures, including the effect of wind on the airplane during taxiing and the appropriate control position for such conditions.
- ☐ 2. Positions flight controls properly, considering the wind.
- ☐ 3. Performs a brake check immediately after the airplane begins moving.
- ☐ 4. Controls direction and speed without excessive use of brakes.
- ☐ 5. Complies with airport markings, signals, and ATC clearances.
- ☐ 6. Avoids other aircraft and hazards.
- ☐ 7. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Safety preparations/precautions stressed
- ☐ 2. Speed awareness and safe control
- ☐ 3. Use of brakes, employ cautiously
- ☐ 4. Clearance(s), read-back and compliance
- ☐ 5. Position flight controls properly vs. wind
- ☐ 6. Rules of right-of-way, use safely
- ☐ 7. Taxiing during low visibility
- ☐ 8. Crosswind weathervaning tendency
- ☐ 9. Brakes checked after first movement
- ☐ 10. Hand signals of linemen

COMMON ERRORS

- ☐ 1. Controls improperly used versus wind
- ☐ 2. Checklist, disregard recommendations
- ☐ 3. Yellow or center line disregarded
- ☐ 4. Taxied with undue speed, poor control
- ☐ 5. Brakes applied unexpectedly and unsafely
- ☐ 6. Aileron controls, tried to steer with
- ☐ 7. Ground traffic awareness inadequate
- ☐ 8. Disorientation, airport position (lost)

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Advise pilot, approval must be obtained prior to moving an aircraft onto the movement area during the hours an airport traffic control tower is in operation.
- ☐ 3. Demonstrate proper use of checklist and all elements, during taxiing operations.
- ☐ 4. Demonstrate speed control, where movement of the airplane is dependent on the throttle, and when the throttle is closed the airplane can be stopped promptly.
- ☐ 5. Demonstrate the proper positioning of flight controls versus wind direction.
- ☐ 6 Advise pilot that CFR's forbid careless and reckless operations of the airplane.
- ☐ 7. Examine pilot to determine a thorough understanding of taxiing and ground operations.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Pilot has contacted control tower and obtained an ATC clearance to taxi airplane on airport.
- ☐ 3. Practice taxi movements and speed control with minimum use of brakes as directed.
- ☐ 4. Practice taxiing keeping flight controls in the proper position as airplane makes turns on the taxiways and ramp areas.
- ☐ 5. Pilot has complied with ATC signals and/or clearances, and followed the proper taxi route.

COMPLETION STANDARDS

- ☐ 1. Pilot has taxied aircraft on the ground with accuracy and safety, while giving full consideration to other aircraft and personnel on the taxiways and ramps while adhering to ATC.
- ☐ 2. Pilot is proficient in maintaining positive control of the airplane's direction and speed of movement on the ground while following markings, signals, and clearances.
- ☐ 3. Pilot obtains ATC approval prior to taxi movement when control tower is operating.
- ☐ 4. Pilot has by oral examination explained safe taxi techniques and procedures.

REFERENCES

AC 61-21A	Flight Training Handbook (51)	AFD	Airport Facility Directory
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	FAA P-8740-20	Preventing Accidents During Aircraft Ground Operations

DATE

Takeoff Check, Before

Preflight Procedures

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Explanation of Checklist Items .2
- ☐ Demonstration of Pre-Takeoff Check .5
- ☐ Pilot Application, Trial and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Airport Runway and Taxiway Diagram
- ☐ Manufacturer's Recommended Checklist
- ☐ VFR Aeronautical Charts (Current)
- ☐ Clipboard/Mapboard, and Flashlight (Red Lens)

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to the before takeoff check, including the reasons for checking each item and how to detect malfunctions.
- ☐ 2. Positions the airplane properly considering other aircraft, surface conditions, and, if applicable, existing wind conditions.
- ☐ 3. Divides attention inside and outside the cockpit.
- ☐ 4. Ensures that the engine temperature and pressure are suitable for run-up and takeoff.
- ☐ 5. Accomplishes the before takeoff check and ensures that the airplane is in safe operating condition.
- ☐ 6. Reviews takeoff performance airspeeds and expected takeoff distances.
- ☐ 7. Describes takeoff emergency procedures and, if applicable, briefs crew on procedures.
- ☐ 8. Assures no conflict with traffic prior to taxiing into takeoff position.
- ☐ 9. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Anticipation and planning of actions
- ☐ 2. Flight control utilization and coordination
- ☐ 3. Propeller cycling procedures
- ☐ 4. Landing gear extended V-speed (V_{LE})
- ☐ 5. Rejected takeoff (RTO) procedures reviewed
- ☐ 6. Takeoff and departure V-speeds awareness
- ☐ 7. AFM pre-takeoff checklist and procedures
- ☐ 8. Backup CIGARTIP (acronym) checklist
- ☐ 9. Crosswind & crosswind component check
- ☐ 10. Visual traffic check ground and air

COMMON ERRORS

- ☐ 1. Airplane positioning, unsatisfactory
- ☐ 2. Checklist and/or item(s) bypassed
- ☐ 3. Flight controls improperly checked or set
- ☐ 4. Trim, failed to set for takeoff (V_Y)
- ☐ 5. Engine runup, approval of marginal data
- ☐ 6. Airplane safe operating condition in doubt
- ☐ 7. Attention in and out of cockpit inadequate
- ☐ 8. Traffic checks and awareness inadequate
- ☐ 9. Emergency procedures, failed to review
- ☐ 10. Recommended manifold pressure exceeded
- ☐ 11. Passenger seat belt/shoulder straps ignored
- ☐ 12. Magneto switch set to left or right only

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Direct pilot to become thoroughly familiar with all pre-takeoff procedures and checklist in the AFM.
- ☐ 3. Advise the pilot with emphasis, that the "pre-takeoff check" (TOC) is the final verification procedure to ensure that engine indications, flight controls, electrical systems, flight instruments, and avionics are functioning and set, and passengers secure, prior to making the final go/no-go decision.
- ☐ 4. Demonstrate and explain the safe positioning of airplane, correct techniques for completing the preflight procedures and checklist as published in the AFM, while explaining the reasons for each item checked, such as proper settings, indications, frequencies, etc.
- ☐ 5. Demonstrate obtaining ATC takeoff and departure clearance and read back and compliance.
- ☐ 6. Check and note V-speeds and runway length available and set HI to runway, and note time.
- ☐ 7. Discuss the final determination or judgment that airplane is ready and airworthy.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Become entirely familiar with all pre-takeoff procedures and checklist, including reasons for check.
- ☐ 3. Practice the safe positioning of airplane and correct procedures for completing the pre-takeoff checklist as published in the AFM, including passenger briefing.
- ☐ 4. Obtain ATC clearance, note V-speeds and runway length available.
- ☐ 5. Make final judgment that airplane is in a safe operating condition, and the go/no-go decision.

COMPLETION STANDARDS

- ☐ 1. Pilot has positioned airplane in a safe manner while dividing attention inside and outside of the cockpit, also avoided the creation of any hazards, and maintained traffic awareness.
- ☐ 2. Pilot has completed the pre-takeoff check and explained the reasons for checking each item.
- ☐ 3. Pilot has computed the performance speeds and runway length required, obtained an ATC clearance and made the final determination that the airplane is in safe operating condition.

REFERENCES

AC 61-21A	Flight Training Handbook (56)	AFM	Approved Airplane Flight Manual
AC 61-84B	Role of Preflight Preparation	FAA P-8740-7	The Safe Pilot's 12 Golden Rules

DATE

Radio Communications and ATC Light Signals

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Explanation of Checklist Items .2
- ☐ Demonstration .2
- ☐ Pilot Application, Trial and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ Flight Training Handbook
- ☐ Aeronautical Information Manual
- ☐ Aeronautical Charts (Current)
- ☐ Airport Facility Directory

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to radio communications, radio failure, and ATC light signals.
- ☐ 2. Selects appropriate frequencies for facilities to be used.
- ☐ 3. Transmits using recommended phraseology.
- ☐ 4. Acknowledges radio communications and complies with instructions.
- ☐ 5. Uses prescribed procedures following radio communications failure.
- ☐ 6. Interprets and complies with ATC light signals.

ELEMENTS

- ☐ 1. Radio technique
- ☐ 2. Contact procedures
- ☐ 3. Aircraft call signs
- ☐ 4. Ground station call signs
- ☐ 5. Phonetic alphabet, proper use
- ☐ 6. ATC communications procedures
- ☐ 7. Traffic control light signals, understanding
- ☐ 8. Emergency transmissions (121.5 / 7600)
- ☐ 9. Acknowledgement of assigned frequency
- ☐ 10. Chart communication boxes
- ☐ 11. Student pilot identification notification
- ☐ 12. Microphone and stuck mike procedures
- ☐ 13. ATC transponder procedure, CFR 91.215
- ☐ 14. ELT requirements, CFR 91.207

COMMON ERRORS

- ☐ 1. Improper frequency selection
- ☐ 2. Airplane and position, failure to identify
- ☐ 3. Use of obscure or improper phraseology
- ☐ 4. Failure to acknowledge ATC light signals
- ☐ 5. Phonetic alphabet not utilized
- ☐ 6. Confused by the audio control console

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Explain each of the elements, and exhibit the data in the reference material.
- ☐ 3. Demonstrate and explain the correct procedures for establishing radio contact with ATC (ground and control towers) by selecting the proper frequencies from current aeronautical charts, and utilization of proper phraseology and compliance with instructions received. Arrange a display of traffic control light signals, insure compliance with instructions signaled.
- ☐ 4. Explain emergency procedures and squawking code 7600.
- ☐ 5. Direct pilot to read the section "Radio Communications" in AC 61-21A.
- ☐ 6. Test pilot by oral examination to determine complete comprehension of the above.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the section "Radio Communications" in AC 61-21A.
- ☐ 3. Practice the correct procedures for establishing radio contact with ATC (ground and control towers) by selecting the proper frequencies from current aeronautical charts, and utilization of proper phraseology and compliance with instructions received.
- ☐ 4. Demonstrate understanding by completing an oral examination on the above elements.

COMPLETION STANDARDS

- ☐ 1. Pilot has seen and correctly interpreted the tower light gun traffic signals.
- ☐ 2. Pilot has demonstrated by practical test and oral examination the ability to find, decipher and use the communication data on aeronautical charts.
- ☐ 3. Pilot has used the appropriate communication procedures in radio contact with ATC (ground and tower) and did acknowledge and comply with the instruction, and at uncontrolled airports made the timely and correct radio transmissions.
- ☐ 4. Pilot has explained emergency and radio failure procedures.

REFERENCES

AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	AC 20-120	Nondirectional Beacon Frequency Congestion
AIM	Aeronautical Information Manual	AC 90-50B	VHF Radio Frequency Assignment Plan For Aeronautical Operations
AC 61-21A	Flight Training Handbook (76)	AC 90-67A	Light Signals From The Control Tower (ATCT) For Ground Vehicles
AC 20-111	Communication Interference Caused By Unintentional Keyed Microphones	AC 91-50	Importance Of Transponder Operation and Altitude Reporting

DATE

Traffic Patterns

Airport Operations

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.1
☐ Explanation of Pattern Procedures	.5
☐ Demonstration of Pattern Procedures	.3
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Airport Facility Directory
- ☐ Aeronautical Information Manual (AIM)
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"
- ☐ Federal Aviation Regulations, (CFR 91.113)

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to traffic pattern procedures at each class airspace airport, runway incursion avoidance, collision and wake turbulence avoidance, and approach procedure when wind shear is reported.
- ☐ 2. Follows the established traffic pattern procedures, instructions, and rules.
- ☐ 3. Maintains proper spacing from other traffic.
- ☐ 4. Establishes an appropriate distance from the runway or landing area.
- ☐ 5. Avoids wake turbulence encounters.
- ☐ 6. Corrects for wind drift to maintain proper ground track.
- ☐ 7. Remains oriented with runway and landing area in use.
- ☐ 8. Maintains and holds traffic pattern altitude ±50 feet (20 meters), and appropriate airspeed ±5 knots.
- ☐ 9. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Safety precautions must be emphasized
- ☐ 2. Collision avoidance procedures
- ☐ 3. Wake turbulence avoidance and cautions
- ☐ 4. Wind direction, speed, and effects
- ☐ 5. Traffic separation techniques
- ☐ 6. Standard and non-standard procedures
- ☐ 7. Pilot responsibility, see and avoid aircraft
- ☐ 8. Prescribed speed, and altitude
- ☐ 9. ATC clearances compliance
- ☐ 10. Checklist and systematic application
- ☐ 11. Division of attention discipline
- ☐ 12. Right-of-way procedures
- ☐ 13. Wind drift correction angle (crab)
- ☐ 14. Traffic pattern indicators, and wind cone

COMMON ERRORS

- ☐ 1. Pattern entry at wrong altitude
- ☐ 2. Pattern exit, violated procedures
- ☐ 3. Right-of-way, misunderstood
- ☐ 4. Pattern ground track not maintained
- ☐ 5. Checklist and/or item(s) bypassed
- ☐ 6. Allocation of attention inadequate
- ☐ 7. Pattern instructions or rules ignored
- ☐ 8. Wind drift correction improper

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Explain each of the elements, and exhibit the data in the reference material.
- ☐ 3. Demonstrate the established traffic pattern procedures for the airport in use, including all four legs and standard entry, while making corrections for wind drift, and traffic separation, and maintaining altitude and airspeed criteria, and completing pre-landing checklist.
- ☐ 4. Test pilot by oral examination to determine complete comprehension of the above.
- ☐ 5. Conduct postflight critique, to review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Study AC 90-66A Recommended Standard Traffic Patterns and Practices For Aeronautical Operations At Airports
- ☐ 3. Practice the established traffic pattern procedures appropriate to the airport in use, including the basic legs and standard entry, while making corrections for wind drift, and traffic separation, and maintaining altitude and airspeed criteria, and completing pre-landing checklist.
- ☐ 4. Demonstrate understanding by completing an oral examination on the above elements.

COMPLETION STANDARDS

- ☐ 1. Pilot has used strict vigilance and good operating practice and procedures (as published) to enter and depart controlled and uncontrolled airports safely while avoiding aircraft wake turbulence.
- ☐ 2. Pilot has demonstrated the ability to fly the traffic pattern and make the corrections for wind drift, maintain the proper traffic separation while at the instructed airspeed and altitude, and retain runway orientation, used checklist and flew airplane within the objective criteria.

REFERENCES

AC 61-21A	Flight Training Handbook (72)
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 90-23E	Aircraft Wake Turbulence
AC 90-42E	Traffic Advisory Practices At Airport W/O (ATCT)
AC 90-48C	Pilot's Role In Collision Avoidance
AC 90-66A	Recommended Standard Traffic Patterns and Practices For Aeronautical Operations At Airports
AIM	Aeronautical Information Manual
AC 90-43G	Operations Reservations For High Density Traffic Airports

DATE

Airport and Runway Marking and Lighting

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Demonstration of Light Systems .2
- ☐ Present and Explain Elements .3
- ☐ Pilot Locate and Explain All Elements .5
- ☐ Postflight Critique and Discussion .1
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ Airport Diagram
- ☐ Airport Facility Directory
- ☐ Aeronautical Information Manual (AIM)
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to airport and runway markings and lighting.

☐ 2. Identifies and interprets airport, runway and taxiway markings and lighting.

ELEMENTS

- ☐ 1. Airport (rotating) beacon, (day or night)
- ☐ 2. Runway lights, solid and split colored
- ☐ 3. Taxiway lights, blue colored
- ☐ 4. Obstruction lighting systems
- ☐ 5. Runway markings
- ☐ 6. Taxiway markings
- ☐ 7. Airport signs
- ☐ 8. Pilot controlled lighting systems
- ☐ 9. VASI light systems
- ☐ 10. Runway chevron patterns
- ☐ 11. Runway centerline arrowheads
- ☐ 12. Runway overrun or stopways
- ☐ 13. Holding bays, aprons and blastpad areas
- ☐ 14. Displaced threshold markings
- ☐ 15. Fixed distance markers
- ☐ 16. Touchdown zone
- ☐ 17. VFR runways versus IFR runways
- ☐ 18. Holding line, normal and CAT II
- ☐ 19. Wind sock, tetrahedron, and wind tee
- ☐ 20. Segmented circle and traffic indicators

COMMON ERRORS

- ☐ 1. Taxi direction signs to runways, confusing
- ☐ 2. Hold position lines, misinterpreted
- ☐ 3. Rotating beacon, day operation confusing
- ☐ 4. Disorientation, airport position uncertain
- ☐ 5. Runway turn offs, unable to locate
- ☐ 6. Centerlines, failure to follow correctly

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Explain each of the elements, and exhibit the data in the reference material.
- ☐ 3. Acquaint pilot with all of the above elements by visually presenting the various graphics, fixtures and lights, and pointing out that runway numbers are based on magnetic azimuth, and in the interest of safety, insure that the pilot clearly recognizes and understands areas that are not available for landing, takeoff or taxiing.
- ☐ 4. Test pilot by oral examination to determine complete comprehension of the above, and that the ability to interpret airport, runway, taxiway marking, and lighting aids has been acquired.
- ☐ 5. Conduct postflight critique, to review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Follow directed practice in all succeeding taxiing, to insure proper interpretation and compliance, and/or adherence to all airport, runway, taxiway marking, and lighting aids.
- ☐ 3. Demonstrate understanding by completing an oral examination on the above elements.

COMPLETION STANDARDS

- ☐ 1. Pilot has used the reference material to determine the location of airport rotating beacons and confirm what other type of lighting systems are available to the pilot.
- ☐ 2. Pilot has demonstrated his familiarity and understanding with the various lighting systems, airport signs, and markings by use and explanation.
- ☐ 3. Pilot understands that the operation of the airport rotating beacon during the hours of daylight often indicates that the ground visibility is less than 3 miles and/or the ceiling is less than 1,000 feet, and that ATC clearance (SVFR) is required for landing, takeoff, and flight in the traffic pattern except in class G airspace.

REFERENCES

AC 61-21A	Flight Training Handbook (83)
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AFD	Airport Facility Directory
AIM	Aeronautical Information Manual
AC 150-5340-1G	Standards For Airport Markings
AC 150-5340-18C	Standards For Airport Sign Systems
AC 150-5340-27A	Air-To-Ground Radio Control Of Airport Lighting Systems
AC 150-5345-27C	Specification For Wind Cone Assemblies
AC 150-5345-28C	Specification For L-851 Visual Approach Slope Indicators
AC 150-5345-28D	Precision Approach Path Indicator (PAPI) Systems
AC 150-5345-52	Generic Visual Glideslope Indicator (GVGI)
AC 150-5360-12	Airport Signing and Graphics

DATE

Normal Takeoff and Climb

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Preflight Instruction	.1
☐ Instructor Demonstration	.3
☐ Directed Pilot Application and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Critique and Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ Weather Reports and Briefing
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to normal takeoff and climb.
- ☐ 2. Positions the flight controls and flaps for the existing conditions.
- ☐ 3. Taxies into the takeoff position and aligns the airplane on the runway centerline.
- ☐ 4. Advances the throttle to takeoff power.
- ☐ 5. Rotates at recommended airspeed and accelerates to V_Y, ±5 knots during the climb.
- ☐ 6. Retracts the landing gear and flaps after a positive rate of climb indication.
- ☐ 7. Maintains takeoff power to a safe maneuvering altitude, then sets climb power.
- ☐ 8. Maintains directional control and proper wind drift correction throughout the takeoff and climb.
- ☐ 9. Uses noise abatement procedures, as required.
- ☐ 10. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Airspeed control and V-speeds
- ☐ 2. Control of heading, ground and flight
- ☐ 3. Anticipation and planning of actions
- ☐ 4. Coordination of flight controls
- ☐ 5. Collision avoidance, traffic checks
- ☐ 6. Wake turbulence avoidance
- ☐ 7. Throttle and propeller application sequence
- ☐ 8. Manifold pressure limitations or overboosting
- ☐ 9. Different runway surface effects
- ☐ 10. Landing gear retraction procedure

COMMON ERRORS

- ☐ 1. Flight controls/wing flaps, improper use
- ☐ 2. Power application, not as recommended
- ☐ 3. Throttle procedure (hand-on) ignored
- ☐ 4. Failure to maintain runway alignment
- ☐ 5. Failure to direct vision properly
- ☐ 6. Attitude, improper, unsafe pitch at lift-off
- ☐ 7. Control apprehension and hesitation
- ☐ 8. Ailerons, improper use or application
- ☐ 9. Rudder control and coordination problems
- ☐ 10. Landing gear not retracted as scheduled

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Direct pilot to read the chapter "Takeoffs and Departure Climbs" in AC 61-21A, Flight Training Handbook and resolve pilot's questions.
- ☐ 3. Advise and explain to pilot the factors which have a significant effect on the takeoff roll distance and climb performance that must be considered before each takeoff: 1. Gross weight and location of C.G.; 2. Density altitude; 3. Wind speed and direction and relevant component effects; 4. Runway surface type and condition, and if not level, the gradient element; 5. Ground effect.
- ☐ 4. Demonstrate a normal takeoff and climb by employing the AFM SOP and the objective V-speed(s) criteria, and retract landing gear after a positive rate of climb is established. Retract wing flaps after all obstacles have been cleared, maintain takeoff power until reaching an altitude of 500 to 700 feet AGL, or safe maneuvering altitude. Then complete the departure checklist.
- ☐ 5. Direct and monitor pilot's practice of the normal takeoff and climb flight maneuver techniques.
- ☐ 6. Conduct a postflight critique, discussion, and review of procedures and flight techniques.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read and comprehend the chapter "Takeoffs and Departure Climbs" in AC 61-21A, Flight Training Handbook and AFM, then resolve questions.
- ☐ 3. Practice the normal takeoff and climb flight maneuver pursuant to AFM SOP and checklist.
- ☐ 4. Participate in critique, discussion and review of procedures and flight techniques.

COMPLETION STANDARDS

- ☐ 1. Pilot has used all of the above elements to accurately compute the required takeoff distance.
- ☐ 2. Pilot has demonstrated the acquisition of knowledge and the development of flight proficiency by successfully completing the objective, normal takeoff and climb, with skillful competence.

REFERENCES

AC 61-21A	Flight Training Handbook (86)	VEOG	Ground Effect #47
POH	Pilot's Operating Handbook	VEOG	Flight In The Region of Reversed Command In Relation To Takeoffs and Landings #57
AFM	Approved Airplane Flight Manual		
AC 90-23E	Aircraft Wake Turbulence	FAA P-8740-23	Planning Your Takeoff

DATE

Crosswind Takeoff and Climb

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Preflight Instruction	.1
☐ Instructor Demonstration	.2
☐ Directed Pilot Application and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Critique and Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ Weather Reports and Briefing
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"
- ☐ Crosswind Component Computer

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to crosswind takeoff and climb.
- ☐ 2. Positions the flight controls and flaps for the existing conditions.
- ☐ 3. Taxies into the takeoff position and aligns the airplane on the runway centerline.
- ☐ 4. Advances the throttle to takeoff power.
- ☐ 5. Rotates at recommended airspeed and accelerates to V_Y, ±5 knots during the climb.
- ☐ 6. Retracts the landing gear and flaps after a positive rate of climb indication.
- ☐ 7. Maintains takeoff power to a safe maneuvering altitude, then sets climb power.
- ☐ 8. Maintains directional control and proper wind drift correction throughout the takeoff and climb.
- ☐ 9. Uses noise abatement procedures, as required.
- ☐ 10. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Maximum demonstrated crosswind speed
- ☐ 2. Wind conditions, accurate report(s)
- ☐ 3. Directional control vs. ground acceleration
- ☐ 4. Coordination of flight controls
- ☐ 5. Collision avoidance, traffic checks
- ☐ 6. Crab into wind at lift-off to prevent drift
- ☐ 7. Lift-off/climb, at correct AOA and speed
- ☐ 8. Checklist, manufacturer's procedures

COMMON ERRORS

- ☐ 1. Flight controls/wing flaps, improper use
- ☐ 2. Rudder control, insufficient and/or erratic
- ☐ 3. Throttle procedure (hand-on) ignored
- ☐ 4. Failure to control heading
- ☐ 5. Failure to direct vision properly
- ☐ 6. Attitude, improper, unsafe pitch at lift-off
- ☐ 7. Control apprehension and hesitation
- ☐ 8. Ailerons, improper use or application

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Direct pilot to read the chapter "Crosswind Takeoffs and Climbs" in AC 61-21A, and AFM.
- ☐ 3. **Advise and explain that the FAA only requires that an airplane be controllable in a 90° crosswind with a velocity of 0.2 V_{SO}.** V_{SO} is defined as the stall speed in the landing configuration; i.e., if V_{SO} is 50 knots, 50 X 0.2 = 10K. In this example, the airplane is only required to be controllable in a 10K. 90° crosswind. Any flight beyond this regime is experimental.
- ☐ 4. Demonstrate a crosswind takeoff and climb by employing the AFM SOP and the task objective V-speeds criteria. The following principles and techniques must be emphasized: If runway length permits, wings flaps are retracted to reduce drifting at lift-off; Full aileron control must be held into the crosswind as the takeoff roll is started; Elevator control should be slightly forward of neutral until V_{SO} is reached, then neutralized; Normally during acceleration, downwind rudder pressure will be required to hold a straight runway path, and to oppose the weathervaning tendency; At approximately V_{SO} X 1.3 the airplane must be positively rotated to preclude the possibility of side skidding the retractable landing gear; After a positive rate of climb is indicated retract landing gear and maintain takeoff power until reaching an altitude of 700 feet AGL, or a safe maneuvering altitude.
- ☐ 5. Direct and monitor pilot's practice of the crosswind takeoffs and climbs maneuver.
- ☐ 6. Conduct a postflight critique, and review of crosswind procedures and flight techniques.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read and comprehend the chapter "Crosswind Takeoffs and Climbs" in AC 61-21A, Flight Training Handbook and resolve questions.
- ☐ 3. Practice the crosswind takeoff and climb flight maneuver as directed.
- ☐ 4. Participate in critique, discussion and review of procedures and flight techniques.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the acquisition of knowledge and the development of flight proficiency by successfully completing the objective, crosswind takeoffs and climb, while using the above crosswind principles and techniques safely, and competently, without the assistance of a flight instructor.

REFERENCES

FAA P-8740-23	Planning Your Takeoff	POH	Pilot's Operating Handbook
AC 61-21A	Flight Training Handbook (89)	AFM	Approved Airplane Flight Manual

DATE

Normal Approach and Landing

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Preflight Instruction .1
- ☐ Instructor Demonstration .2
- ☐ Directed Pilot Application and Practice 1.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Pilot's Operating Handbook (POH)
- ☐ Manufacturer's Recommended Checklist
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to normal approach and landing.
- ☐ 2. Considers the wind conditions, landing surface, and obstructions.
- ☐ 3. Selects a suitable touchdown point.
- ☐ 4. Establishes the recommended approach and landing configuration and adjusts power and attitude as required.
- ☐ 5. Maintains a stabilized approach and recommended airspeed with gust correction factor applied, ±5 knots.
- ☐ 6. Makes smooth, timely, and correct control application during the roundout and touchdown.
- ☐ 7. Remains aware of the possibility of wind shear and/or wake turbulence.
- ☐ 8. Touches down smoothly at approximate stalling speed, at a specified point at or within 200 feet (60 meters) beyond a specified point with no drift, and with the airplane's longitudinal axis aligned with and over the runway centerline.
- ☐ 9. Maintains crosswind correction and directional control throughout the approach and landing.
- ☐ 10. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Landing performance data and limitations
- ☐ 2. Normal landing configuration and speeds
- ☐ 3. Power setting and trimming techniques
- ☐ 4. Flaps, correct stage extension position
- ☐ 5. Obstructions and hazards considerations
- ☐ 6. Approach stabilization recommendations
- ☐ 7. Airspeed, appropriate for wind conditions
- ☐ 8. Flight control utilization and coordination
- ☐ 9. Wind shear and wake turbulence caution
- ☐ 10. Checklist and correct interval utilization
- ☐ 11. Accurately controlled descent angle
- ☐ 12. Accurately controlled airspeed
- ☐ 13. Control of heading, ground and flight
- ☐ 14. Brake application as required with caution

COMMON ERRORS

- ☐ 1. Performance data misinterpreted
- ☐ 2. Final approach, low and/or slow
- ☐ 3. Configuration approach/landing improper
- ☐ 4. Roundout (flare) high and uncontrolled
- ☐ 5. Roundout control inadequate
- ☐ 6. Touchdown with hard impact
- ☐ 7. Drift or crab at time of touchdown
- ☐ 8. Airspeed erratic, inadequate scanning
- ☐ 9. Flight control application uncoordinated
- ☐ 10. Heading control inaccurate and faulty
- ☐ 11. Uncertainty, indecision, or apprehension
- ☐ 12. Go-around situation not recognized

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Direct pilot to read the section "Normal Approach and Landing" and "Faulty Approaches and Landings" in AC 61-21A, and the same section in the AFM.
- ☐ 3. Demonstrate and simultaneously explain the elements, procedures and techniques required to consistently land the airplane on the desired spot of the runway, in the proper landing attitude at V_{SO}, while adhering to the manufacturer's recommendations, and the prescribed objective flight parameters, and complying with local pattern practices, and observing all safety precautions and standards.
- ☐ 4. Conduct postflight critique, to review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the two sections about Approaches and Landings, in AC 61-21A.
- ☐ 3. Complete supervised practice of normal approach and landing, as demonstrated.

COMPLETION STANDARDS

- ☐ 1. Pilot has consistently performed and explained the procedures and techniques required for normal approaches and landings, while adhering to all the objective criteria, and applying the above elements, with skillful safe flight proficiency.

REFERENCES

AC 61-21A	Flight Training Handbook (95)	AC 90-34	Accidents Resulting From "Wheelbarrowing"
AC 61-47A	Use Of Approach Slope Indicators For Pilot Training	AC 91-6A	Water, Slush, and Snow On The Runway

DATE

Crosswind Approach and Landing

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Preflight Instruction	.1
☐ Instructor Demonstration	.2
☐ Directed Pilot Application and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Pilot's Operating Handbook (POH)
- ☐ Manufacturer's Recommended Checklist
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

1. ☐ Exhibits knowledge of the elements related to crosswind approach and landing.
2. ☐ Considers the wind conditions, landing surface, and obstructions.
3. ☐ Selects a suitable touchdown point.
4. ☐ Establishes the recommended approach and landing configuration and adjusts power and attitude as required.
5. ☐ Maintains a stabilized approach and recommended airspeed with gust correction factor applied, ±5 knots.
6. ☐ Makes smooth, timely, and correct control application during the roundout and touchdown.
7. ☐ Remains aware of the possibility of wind shear and/or wake turbulence.
8. ☐ Touches down smoothly at approximate stalling speed, at a specified point at or within 200 feet (60 meters) beyond a specified point with no drift, and with the airplane's longitudinal axis aligned with and over the runway centerline.
9. ☐ Maintains crosswind correction and directional control throughout the approach and landing.
10. ☐ Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Low wing crosswind approach method
- ☐ 2. Wind crab crosswind approach method
- ☐ 3. Judgment of drift correction angle (WCA)
- ☐ 4. Judgment decisive and timely
- ☐ 5. Flight control precise and coordinated
- ☐ 6. Stabilized descent angle, and speed
- ☐ 7. Weathervaning tendency awareness
- ☐ 8. Crosswind component determination
- ☐ 9. Rudder travel limit versus wind velocity
- ☐ 10. Flaps extension versus wind component
- ☐ 11. Aligning airplane with extended centerline
- ☐ 12. Airspeed awareness and accurate control
- ☐ 13. Brakes, minimum, use with caution
- ☐ 14. Touchdown control techniques
- ☐ 15. After-landing rollout techniques
- ☐ 16. Manufacturer's recommended methods

COMMON ERRORS

- ☐ 1. Sideloads imposed at touchdown, unsafe
- ☐ 2. Crosswind component exceeded
- ☐ 3. Drifting excessively without correction
- ☐ 4. Directional control after landing unsafe
- ☐ 5. Flight control coordination inadequate
- ☐ 6. Uncertainty, indecision, or apprehension
- ☐ 7. Brakes applied unexpectedly and unsafely
- ☐ 8. Go-around situation not recognized

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Direct pilot to read the section "Crosswind Approach and Landing" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain the manufacturer's recommended configuration and speeds for crosswind approachs and landings, minding existing crosswind component, and existing surface conditions. Minimum KIAS must not be violated. In crosswind conditions, use the minimum flap setting that can be safely used for the runway available. The crab or combination method of drift correction may be used. The wing-low method gives the best control. Do not contact runway with drift; go around if uncertain, up wind gear touches first, downwind rudder to line up nose to centerline. After touchdown, hold a straight course, with flight controls in the correct position versus wind, cautious braking, if required.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Crosswind Approach and Landing", in AC 61-21A.
- ☐ 3. Complete supervised practice of crosswind approach and landing, as demonstrated.

COMPLETION STANDARDS

- ☐ 1. Pilot has consistently performed and explained the procedures and techniques required for crosswind approaches and landings, while adhering to all the objective criteria, and applying the above elements, with skillful safe flight proficiency.

REFERENCES

AC 61-21A Flight Training Handbook (106) | AC 90-23E Aircraft Wake Turbulence

DATE

Soft-Field Takeoff and Climb

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Preflight Instruction	.1
☐ Instructor Demonstration	.2
☐ Directed Pilot Application and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ Weather Reports and Briefing
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"
- ☐ Airport Facility Directory, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to soft-field takeoff and climb.
- ☐ 2. Positions the flight controls and flaps for existing conditions to maximize lift as quickly as possible.
- ☐ 3. Taxies onto the takeoff surface at a speed consistent with safety and aligns the airplane without stopping while advancing the throttle smoothly to takeoff power.
- ☐ 4. Establishes and maintains a nose high attitude to quickly reduce the weight on the wheels in contact with the rough or soft surface.
- ☐ 5. Remains in ground effect after takeoff while accelerating to V_Y.
- ☐ 6. Maintains V_Y, ±5 knots.
- ☐ 7. Retracts the landing gear and flaps after a positive rate of climb indication.
- ☐ 8. Maintains takeoff power to a safe maneuvering altitude, then sets climb power.
- ☐ 9. Maintains directional control and proper wind drift correction throughout the takeoff and climb.
- ☐ 10. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Runway surface conditions vs. drag effect
- ☐ 2. Wind conditions and calculations
- ☐ 3. Runway alignment with no stopping
- ☐ 4. Flight controls, initial position and settings
- ☐ 5. Directional control during acceleration
- ☐ 6. Crosswind control application techniques
- ☐ 7. Principles of flight and ground effect
- ☐ 8. Performance and limitation verification

COMMON ERRORS

- ☐ 1. Airplane halted on runway prior to takeoff
- ☐ 2. Throttle procedure (hand-on) ignored
- ☐ 3. Attitude, improper, unsafe pitch at lift-off
- ☐ 4. Torque and P-factor forces ignored
- ☐ 5. Drifting uncontrolled during initial climb
- ☐ 6. Touchdown inadvertently after lift-off
- ☐ 7. Judgment impaired and/or deficient
- ☐ 8. Checklist, disregard recommendations

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria and review with pilot the relative aerodynamics factors having a significant effect on this maximum performance takeoff, such as: wing flap position vs. lift or drag ratio; Ground effect phenomenon vs. wingspan height AGL; The marginal flight control and/or hazards of attempting to climb at airspeed less than V_X; Angle of attack (AOA) vs. ground effect and applied power; P-factor and rudder application and coordination to maintain directional control in the center of the takeoff path.
- ☐ 2. Demonstrate a maximum performance soft-field takeoff and climb by setting flaps and trim pursuant to AFM SOP, and taxiing onto the runway surface at a speed consistent with safety, aligning airplane on the takeoff path without stopping. Apply maximum takeoff power while establishing the proper pitch attitude (high AOA) during the acceleration, which will raise the nosewheel off the surface and cause the rapid transfer of weight from the main gear to the wings. Stress the need for firm smooth right rudder usage for this phase of flight. Thereafter the airplane will lift off at a speed below V_X as a result of ground effect. Maintain level flight by cautiously reducing the pitch attitude; do not permit the airplane to settle back onto the surface, and never attempt to climb while below V_X. Accelerate to V_Y and complete normal departure techniques, procedures, and checklist.
- ☐ 3. Direct and monitor pilot's practice of the soft-field takeoff and climb maneuver.
- ☐ 4. Conduct a postflight critique, discussion and review of procedures and flight techniques.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read and comprehend the chapter "Soft-Field Takeoffs and Climbs" in AC 61-21A.
- ☐ 3. Practice the soft-field takeoff and climb flight maneuver as directed.
- ☐ 4. Participate in critique, discussion and review of procedures and flight techniques.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the acquisition of knowledge and the development of flight proficiency and skills by successfully completing the objective, soft-field takeoff and climb competently, without the aid of a flight instructor, while applying above objective criteria and adhering to the AFM SOP.

REFERENCES

FAA P-8740-23	Planning Your Takeoff	POH	Pilot's Operating Handbook
AC 61-21A	Flight Training Handbook (92)	AFM	Approved Airplane Flight Manual

DATE

Soft-Field Approach and Landing

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Preflight Instruction	.1
☐ Instructor Demonstration	.2
☐ Directed Pilot Application and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Pilot's Operating Handbook (POH)
- ☐ Manufacturer's Recommended Checklist
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

1. ☐ Exhibits knowledge of the elements related to soft-field approach and landing.
2. ☐ Considers the wind conditions, landing surface, and obstructions.
3. ☐ Selects the most suitable touchdown point.
4. ☐ Establishes the recommended approach and landing configuration and adjusts attitude and power as required.
5. ☐ Maintains a stabilized approach, controlled rate of descent, and recommended airspeed (or in its absence not more than 1.3 V_{SO}) with gust correction factor applied, ±5 knots.
6. ☐ Makes smooth, timely, and correct control application during the roundout and touchdown.
7. ☐ Remains aware of the possibility of wind shear and/or wake turbulence.
8. ☐ Touches down at a minimum descent rate and airspeed, with no drift, and with the airplane's longitudinal axis aligned with and over the landing surface centerline.
9. ☐ Maintains crosswind correction and directional control throughout the approach and landing.
10. ☐ Maintains, after landing, proper position of the flight controls and sufficient speed to taxi on the soft surface.
11. ☐ Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Airspeed vs. power-attitude relationship
- ☐ 2. Heading control maintained consistently
- ☐ 3. Flap usage with calculated caution
- ☐ 4. Power application at touchdown
- ☐ 5. Trim control and continual management
- ☐ 6. Unique touchdown techniques
- ☐ 7. Caution and delayed touchdown
- ☐ 8. Nosewheel vs. tailwheel
- ☐ 9. Shallow approach
- ☐ 10. Manufacturer's recommendations

COMMON ERRORS

- ☐ 1. Performance data misinterpreted
- ☐ 2. Throttle procedure (hand-on) ignored
- ☐ 3. Descent rate (VSI) excessive or ignored
- ☐ 4. Trim system, failure to use properly
- ☐ 5. Wind effect not considered or ignored
- ☐ 6. Nose wheel lowered prematurely
- ☐ 7. Brakes improperly used, (not required)
- ☐ 8. Throttle closed too abruptly or quickly
- ☐ 9. Taxiing procedures (soft field), ignored
- ☐ 10. Go-around situation not recognized

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Direct pilot to read the section "Soft-Field Approach and Landing" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain the manufacturer's recommended procedure for soft field approach and landing, using a shallow stabilized approach at 1.3 V_{SO}, with touchdown at the slowest possible airspeed, and the airplane in a nose high pitch attitude. A slight addition of power may be applied with full back elevator to help keep the nosewheel off the ground until it can no longer aerodynamically be held off the field. It is generally **inadvisable** to retract flaps during the landing roll, they help keep weight off the main wheels, (see AFM). The need for flap retraction is less important than the need for total concentration on maintaining full control of the airplane. The utilization of any brakes must be at the sheer minimum. In tailwheel type airplane, the touchdown should be a three point landing.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Soft Field Approach and Landing" in AC 61-21A.
- ☐ 3. Complete supervised practice of soft-field approach and landing, using manufacturer's recommended procedures and checklist, as demonstrated by instructor.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the unique techniques and understanding of the objective by performing the soft field approach and landing, while operating within the prescribed flight parameters effectively, and explained the elements and cautions required.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AFM	Approved Airplane Flight Manual
AC 61-21A	Flight Training Handbook (pg. 112)	POH	Pilot's Operating Handbook

DATE

Short-Field Takeoff and Climb

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Preflight Instruction	.1
☐ Instructor Demonstration	.2
☐ Directed Pilot Application and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ Weather Reports and Briefing
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"
- ☐ Airport Facility Directory, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to short-field-takeoff and climb.
- ☐ 2. Positions the flight controls and flaps for the existing conditions.
- ☐ 3. Positions the airplane for maximum utilization of available takeoff area.
- ☐ 4. Advances the throttle to takeoff power.
- ☐ 5. Rotates at the recommended airspeed.
- ☐ 6. Climbs at manufacturer's recommended configuration and airspeed, or in their absence at V_X, +5/- 0 knots until the obstacle is cleared, or until the airplane is at least 50 feet (20 meters) above the surface.
- ☐ 7. After clearing the obstacle, accelerates to and maintains V_Y, ±5 knots.
- ☐ 8. Retracts the landing gear and flaps after a positive rate of climb indication.
- ☐ 9. Maintains takeoff power to a safe maneuvering altitude, then sets climb power.
- ☐ 10. Maintains directional control and proper wind drift correction throughout the takeoff and climb.
- ☐ 11. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Flight control utilization and coordination
- ☐ 2. Pitch attitude control emphasized
- ☐ 3. Rudder force coordination emphasized
- ☐ 4. Torque and P-factor considerations
- ☐ 5. V_X and V_Y aerodynamic effectiveness
- ☐ 6. Ground effect and artificial lift

COMMON ERRORS

- ☐ 1. Anticipation and planning inadequate
- ☐ 2. Lift-off or rotation was premature
- ☐ 3. Rudder control, insufficient and erratic
- ☐ 4. Power, attitude, airspeed, control faulty
- ☐ 5. Best angle-of-climb V_X exceeded
- ☐ 6. Best rate-of-climb V_Y exceeded
- ☐ 7. Runway, failed to use entire length
- ☐ 8. Wing flaps, retraction technique improper
- ☐ 9. Throttle procedure (hand-on) ignored
- ☐ 10. Wing flaps, initial positioning improper
- ☐ 11. Flight controls, initial positioning improper
- ☐ 12. Directional control, unsatisfactory
- ☐ 13. Brakes, unexpectedly/improperly utilized
- ☐ 14. Pitch attitude at lift-off, improper/unsafe
- ☐ 15. Climb configuration and KIAS improper
- ☐ 16. Drift during climb, inadequate WCA

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Direct pilot to read the chapter "Short-Field Takeoffs and Climbs" in AC 61-21A.
- ☐ 3. Demonstrate a maximum performance (short-field) takeoff and climb, employing the manufacturer's recommended procedures and the objective V-speeds criteria, and retract landing gear after positive rate of climb is established. Retract wing flaps after all obstacles have been cleared, maintain takeoff power until reaching an altitude of 500 feet AGL, then V_Y.
- ☐ 4. Direct and monitor pilot's practice of the short field takeoff and climb maneuver.
- ☐ 5. Conduct a postflight critique, discussion and review of procedures and flight techniques.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read and comprehend the chapter "Short-Field Takeoffs and Climbs" in AC 61-21A, Flight Training Handbook and resolve questions.
- ☐ 3. Practice the maximum performance (short field) takeoff and climb flight maneuver as directed, using the recommended checklist and procedures.
- ☐ 4. Participate in critique, discussion and review of procedures and flight techniques.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the acquisition of knowledge and the development of flight proficiency and skills by successfully completing the objective maximum performance (short-field) takeoff and climb, proficiently without the assistance of a flight instructor.
- ☐ 2. Pilot consistently completed manufacturer's recommended after-takeoff checklist.

REFERENCES

FAA P-8740-23	Planning Your Takeoff	AFM	Approved Airplane Flight Manual
AC 61-21A	Flight Training Handbook (91)	AC 60-14	Aviation Instructor's Handbook
POH	Pilot's Operating Handbook		

DATE

Short-Field Approach and Landing

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Preflight Instruction .1
- ☐ Instructor Demonstration .2
- ☐ Directed Pilot Application and Practice 1.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Pilot's Operating Handbook (POH)
- ☐ Manufacturer's Recommended Checklist
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to short-field approach and landing.
- ☐ 2. Considers the wind conditions, landing surface, and obstructions.
- ☐ 3. Selects the most suitable touchdown point.
- ☐ 4. Establishes the recommended approach and landing configuration and adjusts attitude and power as required.
- ☐ 5. Maintains a stabilized approach, controlled rate of descent, and recommended airspeed (or in its absence not more than 1.3 V_{SO}) with gust correction factor applied, +5 knots.
- ☐ 6. Makes timely, and correct control application during the roundout and touchdown.
- ☐ 7. Remains aware of the possibility of wind shear and/or wake turbulence.
- ☐ 8. Touches down at a specified point at or within 100 feet (30 meters) beyond a specified point, with little or no float, with no drift, and with the airplane's longitudinal axis aligned with and over the runway centerline.
- ☐ 9. Maintains crosswind correction and directional control throughout the approach and landing.
- ☐ 10. Applies brakes, as necessary, to stop in the shortest distance consistent with safety.
- ☐ 11. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Performance data determination
- ☐ 2. Configuration and trim setup sequence
- ☐ 3. Attitude, pitch and power, precise control
- ☐ 4. Touchdown point selection
- ☐ 5. Airspeed, constant and accurate control
- ☐ 6. Manufacturer's recommended methods
- ☐ 7. Flight control utilization and coordination
- ☐ 8. Directional control after touchdown
- ☐ 9. Brake application as required with caution
- ☐ 10. Checklist is strongly recommended

COMMON ERRORS

- ☐ 1. Performance data misinterpreted
- ☐ 2. Airspeed and rate of descent (VSI) erratic
- ☐ 3. Attitude, failed to establish correctly
- ☐ 4. Throttle procedure (hand-on) ignored
- ☐ 5. Flare and/or touchdown uncontrolled
- ☐ 6. Touchdown, exceeded distance criteria
- ☐ 7. Flap control or retraction inadequate
- ☐ 8. Flight control coordination inadequate
- ☐ 9. Checklist and/or item(s) bypassed
- ☐ 10. Go-around situation not recognized

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Direct pilot to read the section "Short Field Approach and Landing" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain the manufacturer's recommended procedure for maximum performance approach and landing. After determining the current landing performance data, plan clearing a 50' obstacle by minimum altitude, at a high angle of descent and slow airspeed (1.3 V_{SO}). After obstacles are cleared, progressively reduce power and maintain the approach speed by lowering the nose. Touchdown on the main wheels first, beyond and within 100' of a specified spot at V_{SO} power off. Immediately lower the nose wheel, apply aft elevator, and heavy braking as required, while retracting flaps, all with precautions.
- ☐ 4. Supervise pilot's practice of short field approach and landing techniques.
- ☐ 5. Conduct postflight critique, and question and answer period. Preview next flight lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Short Field Approach and Landing" in AC 61-21A.
- ☐ 3. Complete supervised practice of short field approach and landing, as demonstrated.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated and explained the maximum performance approach and landing, including computing performance data, configuration, airspeeds, and related safety factors, while adhering to objective parameters with skillful safe flight proficiency.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AC 61-21A	Flight Training Handbook (110)
AC 61-16A	Flight Instructor's Handbook	POH	Pilot's Operating Handbook

DATE

Go-Around
Rejected (Balked) (Aborted) Landing

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.1
☐ CFI Demonstration and Explanation	.2
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Pilot's Operating Handbook (POH)
- ☐ Manufacturer's Recommended Checklist
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to a go-around.
- ☐ 2. Makes a timely decision to discontinue the approach to landing.
- ☐ 3. Applies takeoff power immediately and establishes the pitch attitude that will slow or stop the descent.
- ☐ 4. Retracts flaps to approach setting.
- ☐ 5. Retracts the landing gear after a positive rate of climb indication.
- ☐ 6. Trims the airplane to accelerate to V_Y before the final flap retraction then climbs at V_Y, ±5 knots.
- ☐ 7. Maintains takeoff power to a safe maneuvering altitude, then sets climb power.
- ☐ 8. Maintains proper wind drift correction and obstruction clearance throughout the transition to climb.
- ☐ 9. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Recognize go-around situations
- ☐ 2. Decision to go around made promptly
- ☐ 3. Go-around procedure and techniques
- ☐ 4. Attitude adjusted and maintained safely
- ☐ 5. Airspeed controlled as recommended
- ☐ 6. Flap management (incrementally)
- ☐ 7. Attitude (pitch) control
- ☐ 8. Power management as recommended
- ☐ 9. Retract landing gear as recommended
- ☐ 10. Control application in proper sequence
- ☐ 11. Manufacturer's recommended methods
- ☐ 12. Torque and P-factor consideration

COMMON ERRORS

- ☐ 1. Hesitation and procrastination, no action
- ☐ 2. Airspeed, failure to establish or maintain
- ☐ 3. Landing flaps, inappropriately retracted
- ☐ 4. Takeoff power not applied correctly
- ☐ 5. Torque and P-factor forces ignored
- ☐ 6. Nose high pitch excessive
- ☐ 7. Checklist, disregard recommendations
- ☐ 8. Stall indications, failure to recognize
- ☐ 9. Flight path deviation ignored
- ☐ 10. Collision avoidance, poor traffic scanning

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Direct pilot to read the section "Go-Arounds (Rejected Landings)" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain the manufacturer's recommended procedure for a go-around (rejected landing), by making a timely decision to discontinue the approach, and immediately applying takeoff power. The nose will rise sharply and veer to the left, change the pitch attitude to stop the descent, and right rudder pressure must be increased to counteract the torque, or P-factor, and keep a straight flight path. Thereafter the landing flaps will be retracted in small increments, or put in the takeoff position to allow acceleration to V_X or V_Y. Once a positive rate of climb is established, the landing gear is retracted. The airplane must be held in the proper flight attitude regardless of the amount of control pressure that is required, and a normal takeoff is continued while the takeoff checklist is being completed.
- ☐ 4. Supervise pilot's practice of go-around (rejected, balked, or aborted landing(s)) techniques.
- ☐ 5. Conduct postflight critique, and question and answer period. Preview next flight lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Go-Arounds (Rejected Landings)" in AC 61-21A.
- ☐ 3. Complete supervised practice of go-around (rejected landing), as demonstrated.

COMPLETION STANDARDS

- ☐ 1. Pilot demonstrated and explained the go-around procedures and techniques as recommended by the manufacturer, while adhering to objective parameters with skillful safe flight proficiency.

REFERENCES

AC 61-21A	Flight Training Handbook (103)
POH	Pilot's Operating Handbook
AC 00-54	Pilot Windshear Guide
AC 90-23E	Aircraft Wake Turbulence
AC 90-48C	Pilots' Role In Collision Avoidance
AC 90-42E	Traffic Advisory Practices At Airports Without Operating Control Towers
AC 90-66A	Recommended Standard Traffic Patterns - For Airports Without Operating Control Towers

DATE

Steep Turns

Performance Maneuvers

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Instructor Demonstration .2
- ☐ Directed Pilot Application and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to steep turns.
- ☐ 2. Selects an altitude that allows the task to be completed no lower than 1,500 feet AGL (460 meters) or the manufacturer's recommended altitude, whichever is higher.
- ☐ 3. Establishes and maintains the manufacturer's recommended entry speed (or in its absence, the design maneuvering speed), ±5 knots.
- ☐ 4. Smoothly enters a coordinated steep 360° turn with a 50° bank, ±5°, immediately followed by at least a 360° turn in the opposite direction.
- ☐ 5. Divides attention between airplane control and orientation.
- ☐ 6. Rolls out on the entry heading ±5°.
- ☐ 7. Maintains the entry altitude throughout the maneuver, ±100 feet (30 meters).

ELEMENTS

- ☐ 1. Altitude, appropriate safe selection
- ☐ 2. Orientation, maintain position and attitude
- ☐ 3. Attention, proper division and allocation
- ☐ 4. Anticipation and planning of actions
- ☐ 5. Power application and management
- ☐ 6. Flight control application and coordination
- ☐ 7. Entry airspeed and techniques
- ☐ 8. Turn stabilization, prompt and accurate
- ☐ 9. Turn rate and radius ratio - varies with AS
- ☐ 10. Recovery rollout techniques and timing
- ☐ 11. Designed maneuvering airspeed V_A
- ☐ 12. Rudder, emphasize proper usage

COMMON ERRORS

- ☐ 1. Pitch, bank, and power uncoordinated
- ☐ 2. Flight control uncoordinated
- ☐ 3. Poor pilot posture-tendency to lean
- ☐ 4. Exceeds designed maneuvering speed
- ☐ 5. Slipping and/or skidding (Inclinometer)
- ☐ 6. Disorientation, position confusion
- ☐ 7. Anticipation and planning inadequate
- ☐ 8. Coordination inadequate and/or unsafe
- ☐ 9. Altitude and airspeed control ineffectual
- ☐ 10. Stalled inadvertently, unsafe technique
- ☐ 11. Altitude deviations, corrections improper
- ☐ 12. Recovery on incorrect heading

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Instruct pilot that steep power turns are advanced coordination maneuvers which consist of turns in either direction, using a bank steep enough to cause an overbanking tendency during which maximum turning performance is attained, and relatively high load factors are imposed. Precise coordination, accurate timing, and careful airspeed control are required, and any inept control usage, or errors in technique, will be immediately apparent.
- ☐ 3. Demonstrate and simultaneously explain steep turns and the relationship of bank angle, load factor, and stalling speed. Also the overbanking tendency and torque effect in right and left turns, using the manufacturer's referred V_A speed, and the control application procedures to complete the turns, rolling out on the desired heading, and adhering to all objective criteria.
- ☐ 4. Conduct postflight critique, and question and answer period. Preview next flight lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Steep Power Turns" in AC 61-21A.
- ☐ 3. Practice and experience the G-force and required back pressure on the elevator, to overcome the load factor and power needed to hold altitude in the steep turn.

COMPLETION STANDARDS

- ☐ 1. Pilot explained and repeatedly demonstrated the awareness of increased load factors, stall speeds, and the added power required to maintain a constant altitude turn at 50° angle of bank in coordinated flight; and rolled out on the proper heading, while maintaining orientation throughout the performance of the maneuver, steep power turns.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AFM	Approved Airplane Flight Manual
AC 61-21A	Flight Training Handbook (158)		

DATE

Chandelles

Performance Maneuvers

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Instructor Demonstration .2
- ☐ Directed Pilot Application and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to performance factors associated with chandelles.
- ☐ 2. Selects an altitude that will allow the maneuver to be performed no lower than 1,500 feet AGL (460 meters) or the manufacturer's recommended altitude, whichever is higher.
- ☐ 3. Establishes the entry configuration at an airspeed no greater than the maximum entry speed recommended by the manufacturer (not to exceed V_A).
- ☐ 4. Establishes approximately, but does not exceed, 30° of bank.
- ☐ 5. Simultaneously applies specified power and pitch to maintain a smooth, coordinated climbing turn with constant bank to the 90° point.
- ☐ 6. Begins a coordinated constant rate of rollout from the 90° point to the 180° point maintaining specified power and a constant pitch attitude that will result in a rollout within ±10° of desired heading and airspeed within + 5 knots of power-on stall speed.
- ☐ 7. Reduces pitch attitude to resume straight-and-level flight at the final altitude attained, ±50 feet (20 meters).

ELEMENTS

- ☐ 1. Altitude, appropriate and safe selection
- ☐ 2. Entry airspeed and power
- ☐ 3. Designed maneuvering airspeed V_A
- ☐ 4. Attention, proper division and allocation
- ☐ 5. Coordination of flight controls
- ☐ 6. Orientation, maintain position and attitude
- ☐ 7. Torque and P-factor considerations
- ☐ 8. Maximum performance realization
- ☐ 9. Altitude, maximum gain
- ☐ 10. Completion standards and techniques

COMMON ERRORS

- ☐ 1. Pitch, bank, and power uncoordinated
- ☐ 2. Altitude, maneuver criteria disregarded
- ☐ 3. Failure to recover on correct heading
- ☐ 4. Exceeds V_A designed maneuvering speed
- ☐ 5. Entry technique and criteria improper
- ☐ 6. Flight control application uncoordinated
- ☐ 7. Anticipation and planning insufficient
- ☐ 8. Maximum performance unfulfilled
- ☐ 9. Torque and P-factor forces ignored
- ☐ 10. Stalled inadvertently, unsafe technique

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Instruct pilot that chandelles are advanced coordination maneuvers which consists of attainment of airplane's maximum performance in 180° climbing turn, while converting the airspeed to the greatest possible gain in altitude.
- ☐ 3. Demonstrate and simultaneously explain the chandelle by making a coordinated roll into a 30° bank, then apply back pressure to the elevator control to begin the climbing turn; gradually add ful power and try to maintain V_A speed. Throughout the first 90° of the turn, the bank angle of 30° must be maintained, and the pitch attitude should be smoothly increased at a constant rate. Throughout the second 90° of the turn the pitch attitude must remain constant, but slowly roll out of the 30° bank at a constant rate until the 180° point of the turn is reached. The chandelle is completed at the 180° point, with the wings level, full power and the airspeed just above V_S speed (cruise configuration). Recover by lowering the nose to level flight attitude and then increasing airspeed while maintaining altitude.
- ☐ 4. Conduct postflight critique, and question and answer period. Preview next flight lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Chandelles" in AC 61-21A.
- ☐ 3. Practice chandelles which incorporates the elements of airspeed, banking, and pitch control, orientation, planning, and coordination to obtain a high degree of flight proficiency.

COMPLETION STANDARDS

- ☐ 1. Pilot explained and demonstrated the chandelles with skillful use of coordination, orientation, planning, and feel for maximum-performance flight. Evidenced positive control techniques at varying air speeds and attitudes, while operating within the objective and flight performance limits effectively.

REFERENCES

AC 61-21A	Flight Training Handbook (161)	POH	Pilot's Operating Handbook
AFM	Approved Airplane Flight Manual		

DATE

Lazy Eights

Performance Maneuvers

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Instructor Demonstration .3
- ☐ Directed Pilot Application and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to performance factors associated with lazy eights.
- ☐ 2. Selects an altitude that will allow the task to be performed no lower than 1,500 feet AGL (460 meters) or the manufacturer's recommended altitude, whichever is higher.
- ☐ 3. Selects a prominent 90° reference point in the distance.
- ☐ 4. Establishes the recommended entry power and airspeed.
- ☐ 5. Plans and remains oriented while maneuvering the airplane with positive, accurate control, and demonstrates mastery of the airplane.
- ☐ 6. Achieves the following throughout the task –
  - (a) constant change of pitch, bank, and turn rate.
  - (b) altitude and airspeed consistent at the 90° points, ±100 feet (30 meters) and ±10 knots respectively.
  - (c) through proper power setting, attains the starting altitude and airspeed at the completion of the maneuver, ±100 feet (30 meters) and ±10 knots respectively.
  - (d) heading tolerance ±10° at each 180° point.
- ☐ 7. Continues the task through at least two 180° circuits and resumes straight-and-level flight.

ELEMENTS

- ☐ 1. Constantly changing attitude
- ☐ 2. Dividing attention, cockpit and horizon
- ☐ 3. Flight control application and coordination
- ☐ 4. Consecutive and opposite 180° turns
- ☐ 5. Anticipation, planning, and timing
- ☐ 6. Torque and P-factor considerations

COMMON ERRORS

- ☐ 1. Bank or pitch angles abrupt or excessive
- ☐ 2. Rudder control, insufficient and/or erratic
- ☐ 3. Torque correction, wrong and/or delayed
- ☐ 4. Pitch, bank, and power uncoordinated
- ☐ 5. Anticipation and planning inadequate
- ☐ 6. Recovery from maneuver uncoordinated
- ☐ 7. Disorientation, vertigo and dizziness
- ☐ 8. Flight control rough and/or uncoordinated
- ☐ 9. Maneuver faulty, slipping and/or skidding
- ☐ 10. Objective performance limits violated

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Explain that prominent reference points should be selected on the horizon. The reference points should be 45°, 90°, and 135° from the direction in which the maneuver is begun.
- ☐ 3. Demonstrate and explain the lazy eight maneuver which consists of two alternating symmetrical 180° precision climbing and descending turns in opposite directions, and emphasizing the following ten essential features: 1. Pitch and roll are constantly changing, 2. Altitude at the top of each climb is the same at the 90° keypoint, 3. Altitude at the bottom of each descent is the same at the 180° keypoint of each turn, 4. Airspeed (V_X) at the top of each climb is the same at the 90° point of each turn, 5. The airspeed (V_A) at the base of each descent is the same at the 180° keypoint of each turn, 6. Maximum nose-up pitch and lowest nose-down pitch occur respectively at the 45° and 135° keypoint of each turn. 7. Maximum bank occurs as the 90° point of each turn (45° bank), 8. The nose cuts down through the horizon at the 90° point of each turn, 9. Each turn is an exact 180° change in direction, 10. The wings and nose each reach their level attitudes simultaneously as the airplane reaches the 180° keypoint of each turn.
- ☐ 4. Conduct postflight critique, and question and answer period. Preview next flight lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Lazy 8" in AC 61-21A, Flight Training Handbook.
- ☐ 3. Practice making the lazy eights, the climbs and descents with the proportional turns and develop the feel for varying control forces, and the ability to plan pilot actions.

COMPLETION STANDARDS

- ☐ 1. Pilot has performed the lazy eight based on planning, orientation, coordination, smoothness, altitude, and airspeed control, with a high degree of piloting skills, while operating within the objective and flight performance limits effectively.

REFERENCES

AC 61-21A Flight Training Handbook (163) | POH Pilot's Operating Handbook
AFM Approved Airplane Flight Manual

DATE

Eights–On–Pylons

Ground Reference Maneuver

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Instructor Demonstration .2
- ☐ Directed Pilot Application and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"
- ☐ Pilot's Operating Handbook (POH)

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to eights–on–pylons including the relationship of groundspeed change to the performance of the maneuver.
- ☐ 2. Determines the approximate pivotal altitude.
- ☐ 3. Selects suitable pylons, considering emergency landing areas, that will permit approximately 3 to 5 seconds of straight-and-level flight between them.
- ☐ 4. Attains proper configuration and airspeed prior to entry.
- ☐ 5. Applies the necessary corrections so that the line-of-sight reference line remains on the pylon with minimum longitudinal movement.
- ☐ 6. Exhibits proper orientation, division of attention, and planning.
- ☐ 7. Applies the necessary wind-effect correction to track properly between pylons.
- ☐ 8. Holds pylon using appropriate pivotal altitude avoiding slips and skids.

ELEMENTS

- ☐ 1. Diversion of attention outside of cockpit
- ☐ 2. Anticipation and planning of action
- ☐ 3. Timing of turn entries and rollouts
- ☐ 4. Pivotal altitude, determining accurately
- ☐ 5. Minimum safe altitude awareness
- ☐ 6. Selection of safe ground pylons

COMMON ERRORS

- ☐ 1. Failure to maintain pivotal altitude
- ☐ 2. Rudder control, insufficient and/or erratic
- ☐ 3. Faulty coordination, slip and/or skid
- ☐ 4. Entry technique and criteria improper
- ☐ 5. Disorientation, vertigo and dizziness
- ☐ 6. Flight below minimum safe altitude
- ☐ 7. Lateral axis point (wing tip) not on pylon
- ☐ 8. Emergency landing area unavailable

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Instruct pilot that the eights-on-pylons is the most advanced and difficult of the low altitude flight training maneuvers. This procedure develops the pilot's ability to fly by subconscious sense and feel. Also there is only one "precise" altitude by which the lateral axis of the airplane's wing tip will appear to pivot on the pylon. In a no wind condition the formula to determine the approximate pivotal altitude for nautical airspeeds is: (PA = $KIAS^2 \div 11.3275$), e.g. GS of 85 kts $^2 = 7225 \div 11.3275 = 638'$ AGL. Pivotal altitude is quite critical and may be changed by slight variations in GS, caused by changes in weight, temperature, power setting, or wind change.
- ☐ 3. Demonstrate the eights-on-pylons, and pylon selection on a line 90° to the wind, and in proximity of emergency landing area, set power and establish pivotal altitude. Start maneuver with a downwind angle of 45° between the pylons. Present the techniques for rolling into initial turn, holding pivotal altitude, wind drift correction, banking control, maintaining lateral axis (wing tip) on the pylon while circling alternately right and left around the two reference points. If the pylon appears to **move back** from the line of sight, the altitude is **too low**. If the pylon appears to **move forward** from the line of sight, the altitude is **too high**. The statute mile PA formula is $GS^2 \div 15$.
- ☐ 4. Advise pilot that using rudder pressure to yaw the airplane and force the wing and reference line forward or backward to the pylon is a **dangerous** technique and must not be attempted.
- ☐ 5. Supervise pilot's practice of eights–on–pylons, including pylon selection and pilot techniques.
- ☐ 6. Conduct postflight critique, and question and answer period. Preview next flight lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Eights–On–Pylons" in AC 61-21A.
- ☐ 3. Determine the pivotal altitude and select the ground reference points, and complete supervised practice of eights-on-pylons, making a figure "8" track, using manufacturer's recommended procedures and checklist, as demonstrated by instructor. Rule of thumb, for 100 SMPH X 7 = 700' AGL.

COMPLETION STANDARDS

- ☐ 1. Pilot has performed the eights–on–pylons although attention was diverted outside the cockpit to maintain a pivotal alignment of the lateral axis of the airplane and the pylons with skillful coordinated flight proficiency, while adhering to the maneuver parameters.

REFERENCES

AC 61-21A Flight Training Handbook (141)

DATE

Pilotage (Ground Features)

Navigation

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Explanation and Demonstration	.5
☐ Pilot Application, Trial and Practice	2.0
☐ Postflight Critique and Discussion	.3
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aeronautical Charts (Current)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ Flight Computer and Plotter
- ☐ Flight Plan Forms and Flight Logs

OBJECTIVE

The FAA requires that the pilot applicant:

1. ☐ Exhibits knowledge of the elements related to pilotage.
2. ☐ Correctly flies to at least the first planned checkpoint to demonstrate accuracy in computations, considers available alternates, and suitable action for various situations including possible route alteration by the examiner.
3. ☐ Follows the course solely by reference to landmarks.
4. ☐ Identifies landmarks by relating the surface features to chart symbols
5. ☐ Navigates by means of precomputed headings, groundspeed, and elapsed time.
6. ☐ Verifies the airplane's position within 1 nautical mile (1.85 Km) of flight planned route at all times.
7. ☐ Arrives at the en route checkpoints and destination within 3 minutes of the ETA.
8. ☐ Corrects for, and records, the differences between preflight fuel, groundspeed, and heading calculations and those determined en route.
9. ☐ Maintains appropriate altitude, ±100 feet (30 meters) and established heading, ±10°.
10. ☐ Completes prescribed checklists.

ELEMENTS

- ☐ 1. Chart symbols and interpretation
- ☐ 2. Terrain features, location and recognition
- ☐ 3. Landmarks, make conspicuous selection
- ☐ 4. Navigation primarily by use of landmarks
- ☐ 5. Fly a pre-planned ground track
- ☐ 6. Time, speed and distance calculations
- ☐ 7. Estimated time of arrival (ETA)
- ☐ 8. Fuel (GPH) vs. legal reserve,(CFR 91.151)
- ☐ 9. Pilot's planning sheet completion
- ☐ 10. Visual flight log preparation and utilization
- ☐ 11. Airport destination, required data checked
- ☐ 12. Flight progress record maintained current

COMMON ERRORS

- ☐ 1. Disorientation, especially right from left
- ☐ 2. Failure to consider pattern of landmarks
- ☐ 3. Misinterpretation of chart symbols
- ☐ 4. Checkpoints, failure to fix on the course
- ☐ 5. Inappropriate selection of checkpoints
- ☐ 6. Flight progress, failed to maintain record
- ☐ 7. Neglected fuel flow management
- ☐ 8. Failure to maintain flight prerequisites
- ☐ 9. HI, failure to reset frequently to compass
- ☐ 10. Position, precise location undetermined
- ☐ 11. Cockpit management inadequate
- ☐ 12. Collision avoidance, poor traffic scanning
- ☐ 13. Flight plan opening and/or closing ignored
- ☐ 14. Landing upon return unsatisfactory

INSTRUCTOR'S ACTIONS

1. ☐ Explain and discuss the lesson objective, and the required knowledge criteria.
2. ☐ Direct pilot to read the chapter "Pilotage" in AC 61-21A.
3. ☐ Demonstrate and simultaneously explain and acquaint pilot with the pilotage techniques and procedures used in planning a cross country flight, with the selection of appropriate checkpoints, and completing a flight log, while using each of the above elements in the process.
4. ☐ Demonstrate and simultaneously explain the pilotage method of airplane navigation, which is accomplished solely by means of flying from one visible landmark to another, (prominent checkpoints), while employing all the necessary procedures of cross country pilotage navigation which would assure accurate compliance with lesson criteria.
5. ☐ Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

1. ☐ Participate in discussion of objective, listen, take notes, ask and solve questions.
2. ☐ Read the chapter "Pilotage" in AC 61-21A.
3. ☐ Make a cross country flight using the flight log prepared with the pilotage navigation techniques and procedures. Observe checkpoints, note arrival times and make corrections. Record the differences between preflight calculations for fuel, groundspeed, and heading and those determined en route, while frequently updating the ETA.

COMPLETION STANDARDS

1. ☐ Pilot has accurately completed a cross country flight while explaining the techniques and procedures of navigating solely by means of flying from one visible landmark to another (pilotage), also adhering to all of the objective criteria with skillful flight proficiency.

REFERENCES

AC 61-21A	Flight Training Handbook (168)	VFR-CUG	Visual Flight Rules Chart User's Guide (NOAA)
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge (194)	VEOG	Cross Country Flight, Preflight Planning #06

DATE

Dead Reckoning (Computation)

Navigation

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Demonstration of Methodology	.3
☐ Pilot Application, Trial and Practice	2.0
☐ Postflight Critique and Discussion	.5
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aeronautical Charts (Current)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ Flight Computer and Plotter
- ☐ Flight Plan Forms and Flight Logs

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to dead reckoning.
- ☐ 2. Correctly flies to at least the first planned checkpoint to demonstrate accuracy in computations, considers available alternates, and suitable action for various situations including possible route alteration by the examiner.
- ☐ 3. Follows the course solely by reference to landmarks.
- ☐ 4. Identifies landmarks by relating the surface features to chart symbols
- ☐ 5. Navigates by means of precomputed headings, ground speed, and elapsed time.
- ☐ 6. Verifies the airplane's position within 1 nautical mile (1.85 Km) of flight planned route at all times.
- ☐ 7. Arrives at the en route checkpoints and destination within 3 minutes of the ETA.
- ☐ 8. Corrects for, and records, the differences between preflight fuel, groundspeed, and heading calculations and those determined en route.
- ☐ 9. Maintains appropriate altitude, ±100 feet (30 meters) and established heading, ±10°.
- ☐ 10. Completes prescribed checklists.

ELEMENTS

- ☐ 1. True course chart line designated
- ☐ 2. Wind correction angle (WCA)
- ☐ 3. True heading determined
- ☐ 4. Ground track predicted versus actual
- ☐ 5. Magnetic variation (±) isogonic line
- ☐ 6. Magnetic heading, predicted vs. actual
- ☐ 7. Compass deviation card accuracy
- ☐ 8. Compass heading and heading indicator
- ☐ 9. Airspeed, IAS versus TAS
- ☐ 10. Ground speed anticipated versus actual
- ☐ 11. Estimated time of arrival (ETA)
- ☐ 12. Fuel (GPH) vs. legal reserve, CFR 91.151
- ☐ 13. Pilot's planning sheet completion
- ☐ 14. Visual flight log preparation and updating
- ☐ 15. Clock functioning and set to correct time
- ☐ 16. Compass and inherent idiosyncrasies
- ☐ 17. Line of position (LOP) from VOR or ADF
- ☐ 18. Checkpoints, preferably prominent ones
- ☐ 19. Time, speed and distance calculations
- ☐ 20. Airport destination, required data checked

COMMON ERRORS

- ☐ 1. Calculations incomplete or inaccurate
- ☐ 2. ETA, failure to monitor and update
- ☐ 3. Nautical versus statute mile confusion
- ☐ 4. Flight progress, failed to maintain record
- ☐ 5. HI, failure to reset frequently to compass
- ☐ 6. Flight plan opening and/or closing ignored
- ☐ 7. Cockpit management inadequate
- ☐ 8. Wind direction and speed not verified
- ☐ 9. Checklist and/or item(s) bypassed
- ☐ 10. Position, precise location undetermined

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the chapter "Dead Reckoning" in AC 61-21A.
- ☐ 3. Explain and demonstrate the planning of a flight, and completing a flight log, while using each of the above elements as it is employed in the process.
- ☐ 4. Demonstrate the dead reckoning method of airplane navigation, which is accomplished solely by means of computations based on airspeed, course, heading, wind direction and speed, groundspeed, and elapsed time.
- ☐ 5. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the chapter "Dead Reckoning" in AC 61-21A.
- ☐ 3. Make a cross country flight using the flight log prepared with the dead reckoning navigation techniques and procedures. Observe checkpoints, note arrival times and make corrections. Record the differences between preflight calculations for fuel, groundspeed, and heading and those determined en route, while frequently updating the ETA.

COMPLETION STANDARDS

- ☐ 1. Pilot has accurately completed a cross country flight, using and explaining dead reckoning techniques and procedures while meeting all of the objective criteria.

REFERENCES

AC 61-21A	Flight Training Handbook (170)	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
FAA P-8740-22	Dead Reckoning Navigation	AFD	Airport Facility Directory

DATE

Radio Navigation and Radar Services

Navigation

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Explanation and Demonstration	.5
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.5
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aeronautical Charts (Current)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ Flight Computer and Plotter
- ☐ Flight Plan Forms and Flight Logs

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to radio navigation and ATC radar services.
- ☐ 2. Selects and identifies the appropriate facilities.
- ☐ 3. Locates the airplane's position relative to the navigation facility.
- ☐ 4. Intercepts and tracks a given radial or bearing.
- ☐ 5. Locates position using cross radials or bearings.
- ☐ 6. Recognizes and describes the indication of station passage.
- ☐ 7. Recognizes signal loss and takes appropriate action.
- ☐ 8. Uses proper communication procedures when utilizing ATC radar services.
- ☐ 9. Maintains the appropriate altitude, ±100 feet (30 meters).

ELEMENTS

- ☐ 1. Communication radio tuning and testing
- ☐ 2. Navigational radio tuning and testing
- ☐ 3. VOR signals for tracking
- ☐ 4. VOR determining position fixes
- ☐ 5. VOR warning alarm flag
- ☐ 6. VOR's CDI interpretation
- ☐ 7. VOR TO - FROM indications
- ☐ 8. VOR receiver accuracy check
- ☐ 9. VOR sensitivity, deflection 10° of center
- ☐ 10. ADF's bearing pointer interpretation
- ☐ 11. ADF indications for tracking
- ☐ 12. ADF determining position fixes
- ☐ 13. ADF failure and test procedures
- ☐ 14. DME accuracy 3% or .5 mile
- ☐ 15. Transponder check and code policy
- ☐ 16. RNAV/LORAN navigation systems
- ☐ 17. GPS navigation systems
- ☐ 18. Radio signals and limitations
- ☐ 19. Radio facilities and aeronautical charts
- ☐ 20. Manufacturer's operating instructions
- ☐ 21. Airport destination, required data checked
- ☐ 22. Avionics monitoring essential for safety

COMMON ERRORS

- ☐ 1. Station tuning and identification faulty
- ☐ 2. Misinterpretation of navigational signals
- ☐ 3. Plotting and determination of fixes faulty
- ☐ 4. Radials versus bearings confusion
- ☐ 5. Audio control panel is confusing to pilot
- ☐ 6. Cockpit management inadequate
- ☐ 7. Airport destination facilities not checked
- ☐ 8. NOTAM's not checked, stations OTS
- ☐ 9. HI, failure to reset frequently to compass
- ☐ 10. Checklist and/or item(s) bypassed

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Radio Aids to Navigation" in AC 61-21A.
- ☐ 3. Explain and demonstrate each of the elements as it is employed in the flight.
- ☐ 4. Present the flight planning process and make a demonstration flight by selecting and identifying radio facilities, finding position, intercept and track radials and bearings, locate position by cross radials or bearings, show indications of station passage, and lost radio signal.
- ☐ 5. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the section "Radio Aids to Navigation" in AC 61-21A.
- ☐ 3. Complete a flight log and flight plan, using radio navigation facilities to specify course.
- ☐ 4. Make a cross country flight by selecting and identifying radio facilities, finding position, intercept and track radials and bearings, locate position by cross radials or bearings, show indications of station passage, and lost radio signal.

COMPLETION STANDARDS

- ☐ 1. Pilot has accurately completed a cross country flight, using and explaining radio navigation techniques and procedures while meeting all of the objective criteria.
- ☐ 2. Pilot has a thorough understanding of the fact that the use of radio navigation in "conjunction" with pilotage and dead reckoning, is necessary for effective, safe cross-country flying.

REFERENCES

AC 61-21A	Flight Training Handbook (188)	IEOG	CDI Interpretation #07
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	IEOG	VOR Receiver Accuracy Check #22
FAA P-8740-18	Preflighting Your Avionics-Checklist	VEOG	VOR (Series 1) #15
CFR	91.411, 91.413	VEOG	VOR (Series 2) #16

DATE

Diversion To Alternate Airport

Navigation

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Explanation and Demonstration .5
- ☐ Pilot Application, Trial and Practice 1.0
- ☐ Postflight Critique and Discussion .5
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aeronautical Charts (Current)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ Flight Computer and Plotter
- ☐ Flight Plan Forms and Flight Logs

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to procedures for diversion.
- ☐ 2. Selects an appropriate alternate airport and route.
- ☐ 3. Diverts toward the alternate airport promptly.
- ☐ 4. Makes an accurate estimate of heading, groundspeed, ETA, and fuel consumption to the alternate airport.
- ☐ 5. Maintains the appropriate altitude, ±100 feet (30 meters) and established heading ±10°.

ELEMENTS

- ☐ 1. Position, maintain precise awareness
- ☐ 2. Cockpit organization and management
- ☐ 3. Chart orientation, accurate/immediate
- ☐ 4. Division of attention, correct and safe
- ☐ 5. Emergency evaluation, quick and proper
- ☐ 6. Flight continuation, prompt determination
- ☐ 7. Alternate airport selection appropriate
- ☐ 8. Divert promptly, on a tentative heading
- ☐ 9. Pilotage navigation
- ☐ 10. Dead reckoning navigation
- ☐ 11. Radio aids navigation
- ☐ 12. Select appropriate frequencies
- ☐ 13. Compute reasonably accurate course
- ☐ 14. Determine distance, time, fuel, and ETA

COMMON ERRORS

- ☐ 1. Position, precise location unknown
- ☐ 2. Landmarks, failure to monitor and check
- ☐ 3. Reciprocal of radial, failed to compute
- ☐ 4. Facility frequency selection incorrect
- ☐ 5. Diversion situation not recognized
- ☐ 6. Uncertainty and indecision
- ☐ 7. Alternative action not considered
- ☐ 8. Disorientation (position)
- ☐ 9. Flight progress, failed to maintain record
- ☐ 10. Facility selection incorrect, not identified
- ☐ 11. Miscalculation of course navigation data
- ☐ 12. HI, failure to reset frequently to compass

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Diversion to an Alternate" in AC 61-21A.
- ☐ 3. Advise pilot that the essential key to the successful completion of this task is an accurate and perpetual awareness of present position, and the ability to use rule-of-thumb data.
- ☐ 4. Explain and demonstrate the situations that will cause the pilot to promptly select an alternate airport on the chart and turn immediately toward that destination.
- ☐ 5. Demonstrate the techniques and skills used to confirm the course, and compute time, speed, distance, and fuel, while en route, to the alternate destination, by employing pilotage, dead reckoning, and/or radio navigation methods.
- ☐ 6. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the section "Diversion to an Alternate" in AC 61-21A.
- ☐ 3. Practice dividing attention between solving the problem of a new destination selection and flying the airplane, while using the above elements in locating and selecting an alternate airport on the chart. Flight plan, file, open, and close punctually.
- ☐ 4. Practice making reasonable estimate of heading, groundspeed, arrival time, and fuel consumption to the alternate airport while en route.

COMPLETION STANDARDS

- ☐ 1. Pilot understands before changing course that he must consider the relative distance to all suitable alternate airport destinations, for the given circumstance.
- ☐ 2. Read the section "Diversion to an Alternate" in AC 61-21A.
- ☐ 3. Pilot has demonstrated the ability to select an appropriate landing site, determine the magnetic course, and turn immediately to the new course. Then later, the wind correction, actual distance, and estimated time and fuel required was computed accurately while the airplane proceeded toward the alternate at assigned altitude.

REFERENCES

AC 61-21A	Flight Training Handbook (179)	AC 61-84B	Role of Preflight Preparation
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	VFR-CUG	Visual Flight Rules Chart User's Guide (NOAA)

DATE

Lost Procedures

Navigation

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ CFI Explanation and Demonstration	.5
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.5
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ Aeronautical Charts (Current)
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ Flight Computer and Plotter
- ☐ Flight Plan Forms and Flight Logs

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to lost procedures.
- ☐ 2. Selects the best course of action when given a lost situation.
- ☐ 3. Maintains the original or appropriate heading, and if necessary, climbs.
- ☐ 4. Attempts to identify nearest prominent landmark(s).
- ☐ 5. Uses available navigation aids or contacts an appropriate facility for assistance.
- ☐ 6. Plans a precautionary landing if deteriorating visibility and/or fuel exhaustion is impending.

ELEMENTS

- ☐ 1. Destination, flexibility to change quickly
- ☐ 2. DF (VHF/UHF Direction Finder) stations
- ☐ 3. Confusion and apprehension, act now
- ☐ 4. Radar services, requesting assistance
- ☐ 5. Avoid hesitation and procrastination
- ☐ 6. Selection of safe landing area
- ☐ 7. Line of position (LOP) from VOR or ADF
- ☐ 8. The four "C's"
  - Climb
  - Communicate
  - Confess
  - Comply

COMMON ERRORS

- ☐ 1. WCA, misapplied to desired ground track
- ☐ 2. Nautical versus statute mile confusion
- ☐ 3. Clock time, failure to monitor frequently
- ☐ 4. Ground speed, estimate was erroneous
- ☐ 5. Aeronautical chart misinterpretation
- ☐ 6. Panic and not thinking effectively
- ☐ 7. Flight progress, failure to monitor
- ☐ 8. Hesitation and procrastination, no action
- ☐ 9. Disorientation, position confusion
- ☐ 10. Engine quit due to fuel exhaustion
- ☐ 11. Sectional vs. WAC, wrong scale used
- ☐ 12. Wind correction angle miscalculated

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Losing Track of Position" in AC 61-21A.
- ☐ 3. Demonstrate that the airplane is going to be within a "reasonable" distance of the planned checkpoint and ETA, and should maintain the original or an appropriate heading. Identify landmarks, and climb, if necessary.
- ☐ 4. Explain and demonstrate the "circle of error" (area of probable location), and that the most likely position will be downwind from the desired course.
- ☐ 5. Demonstrate climbing and using available radio navigation aids or contacting an appropriate facility for assistance using 121.5 or any active frequency.
- ☐ 6. Demonstrate the procedures for making a field selection for a precautionary landing, and determination of wind direction. Don't run out of fuel, or daylight, or VFR weather.
- ☐ 7. Advise calm and cautious thinking when selecting the best course of action when lost. Pilot statement, "I am not sure of my exact position, equals I am lost!" Take action now.
- ☐ 8. Conduct a postflight critique, to review procedures, techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the chapter "Losing Track of Position" in AC 61-21A.
- ☐ 3. Practice the above objective with all of the elements on every flight.

COMPLETION STANDARDS

- ☐ 1. Pilot has not gotten lost, but has demonstrated the habit of frequently, and positively identifying present position.
- ☐ 2. Pilot has contacted control towers and ATC and has requested and received practice radar steers successfully.
- ☐ 3. Pilot has demonstrated the ability to select appropriate and safe precautionary landing site and the judgment process to determine the best course of action.

REFERENCES

AC 61-21A	Flight Training Handbook (172)	AC 61-84B	Role of Preflight Preparation
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	VEOG	Emergency or Lost Procedures #19

DATE

Maneuvering During Slow Flight

Flight At Critically Slow Airspeeds

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.1
☐ CFI Demonstration and Explanation	.5
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to flight characteristics and controllability associated with maneuvering during slow flight.
- ☐ 2. Selects an entry altitude that will allow the task to be completed no lower than 1,500 feet (460 meters) AGL or the manufacturer's recommended altitude, whichever is higher.
- ☐ 3. Stabilizes and maintains the airspeed at 1.2 V_{S1}, ± 5 knots.
- ☐ 4. Establishes straight-and-level flight and level turns, with gear and flaps selected as specified by the examiner.
- ☐ 5. Maintains the specified altitude, ±50 feet (20 meters).
- ☐ 6. Maintains the specified heading during straight flight ±5°.
- ☐ 7. Maintains specified bank angle, ±10°, during turning flight.
- ☐ 8. Rolls out on specified headings, ±5°.
- ☐ 9. Divides attention between airplane control and orientation.

ELEMENTS

- ☐ 1. Determination of required speeds
- ☐ 2. Maintenance of desired speeds
- ☐ 3. Control responses vs. airspeed
- ☐ 4. Stall recognition and avoidance
- ☐ 5. Control of heading, attitude, and altitude
- ☐ 6. Flight control coordination
- ☐ 7. Minimum vs. critical airspeed
- ☐ 8. Trim control and management
- ☐ 9. Load factors and stalling speeds
- ☐ 10. Configuration and aerodynamic effects

COMMON ERRORS

- ☐ 1. Configuration, failure to establish
- ☐ 2. Throttle procedure (hand-on) ignored
- ☐ 3. Entry technique improper
- ☐ 4. Airspeed, failure to establish or maintain
- ☐ 5. Trim technique ignored or improper
- ☐ 6. Poor heading and altitude control
- ☐ 7. Stalled inadvertently
- ☐ 8. Inadequate power control
- ☐ 9. Control manner, rough or uncoordinated
- ☐ 10. Torque correction, improper or delayed

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Direct pilot to read, "Maneuvering at Minimum Controllable Airspeed" in AC 61-21A.
- ☐ 3. Demonstrate and simultaneously explain slow flight, and the relationship of configurations, weight, center of gravity, maneuvering loads, angle of bank, and power to flight characteristics and degree of controllability. Further explain the relationship of the maneuver to critical flight situations, such as go-arounds. Demonstrate the performance of the airplane using various landing gear and flap configurations during straight-and-level flight and level turns at a specified airspeed (1.2 V_{S1}, ± 5 knots), while employing the above objective flight criteria.
- ☐ 4. Explain that flight at "minimum controllable" airspeed means a speed at which any further increase in angle of attack or load factor, or reduction in power will cause an immediate stall; at this speed, emphasize the use of both visual and instrument references.
- ☐ 5. Conduct postflight critique, and question and answer period. Preview next flight lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the above assigned section in AC 61-21A, Flight Training Handbook.
- ☐ 3. Learn the relationship of power to altitude control and elevator control to airspeed.
- ☐ 4. Practice slow flight and develop the ability to estimate the margin of safety above the stalling speed by the diminishing response of the airplane to the use of its flight controls, while at an airspeed sufficiently above the stall to permit maneuvering, but close enough to stall to give the sensation of sloppy controls, ragged response to control pressure, and difficulty in maintaining altitude, but without indications of a stall.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the skill and understanding of the objective by maneuvering at a critically slow airspeed, and performing turns, climbs, and descents while operating within the flight performance limits effectively.

REFERENCES

AC 61-21A Flight Training Handbook (149) | AC 60-14 Aviation Instructor's Handbook

DATE

Stalls Power–Off

Flight At Critically Slow Airspeeds

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ CFI Demonstration and Explanation .5
- ☐ Pilot Application, Trial and Practice 1.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to aerodynamic factors associated with power–off stalls and how this relates to actual approach and landing situations.
- ☐ 2. Selects an entry altitude that allows the task to be completed no lower than 1,500 feet (460 meters) AGL or the manufacturer's recommended altitude, whichever is higher.
- ☐ 3. Establishes the stall entry from both straight and turning flight.
- ☐ 4. Slows the airplane to normal approach speed and establishes the approach and landing configuration.
- ☐ 5. Sets power to approach power while establishing the approach attitude.
- ☐ 6. Maintains the specified heading ±10°, in straight flight; a 20° angle of bank, ±10°, in turning flight.
- ☐ 7. Recognizes and announces the onset of the stall by identifying the first aerodynamic buffeting or decay of control effectiveness.
- ☐ 8. Promptly recovers as the stall occurs by reducing the pitch attitude, and simultaneously applying power according to the manufacturer's recommendation. Reduces drag as necessary.
- ☐ 9. Recovers to the point where adequate control effectiveness is regained with the minimum loss in altitude.
- ☐ 10. Allows the airplane to accelerate to approach speed and resumes the approach.

ELEMENTS

- ☐ 1. Stall recognition awareness
- ☐ 2. Control responsiveness, immediate
- ☐ 3. Flight control, smooth and coordinated
- ☐ 4. Performance (reaction) timing
- ☐ 5. Control of assigned headings
- ☐ 6. Power management as recommended
- ☐ 7. Safe entry altitude, and clear traffic area
- ☐ 8. Stall warning indications adherence
- ☐ 9. Ground proximity awareness
- ☐ 10. Airspeed control, avoid excessive gain

COMMON ERRORS

- ☐ 1. Configuration, failure to establish
- ☐ 2. Pitch, heading and/or bank incorrect
- ☐ 3. Control manner, rough or uncoordinated
- ☐ 4. Stall indications, failure to recognize
- ☐ 5. Excessive airspeed and altitude loss
- ☐ 6. Full stall, unsatisfactory performance
- ☐ 7. Torque correction, improper or delayed
- ☐ 8. Stall recovery, inappropriately delayed

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Advise pilot that airplane can stall at any airspeed, attitude, or any power setting.
- ☐ 3. Direct pilot to read the section "Recognition of Stalls" in AC 61-21A.
- ☐ 4. Demonstrate and simultaneously explain the aerodynamics of approach to stalls, power off (approach and landing configuration), and the relationship of various factors such as landing gear and flap configuration, weight, center of gravity, load factor, and bank angle to stall speed, while employing the above entry criteria. Explain the stall recognition cues, and at the first indication of buffeting, apply the above recovery methods immediately, and advise of minimum recovery altitude. Stress the traffic clearing procedures to ensure safety.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Recognition of Stalls" in AC 61-21A.
- ☐ 3. Practice stall recognition, entry, and recovery skills, with smooth control technique; and avoid secondary stall, excessive airspeed, and/or unnecessary altitude loss, spin, and flight below 1,500 feet AGL. Make clearing turns to ensure the area is clear of any other air traffic.

COMPLETION STANDARDS

- ☐ 1. Pilot has described and performed the approach to stall, power–off, maneuver as prescribed by the objective, and at the time of approach to stall recognition, immediate recovery was initiated by decreasing the angle of attack, and adjusting power, as necessary, to regain normal flight attitude and speed; thereafter avoided full stall, and/or secondary stall.

REFERENCES

AC 61-21A	Flight Training Handbook (147)	AC 91-23	Pilot's Weight and Balance Handbook
VEOG	Factors Affecting Stall Speed #28	POH	Pilot's Operating Handbook
VEOG	Stall - Spin Awareness #59	AFM	Approved Airplane Flight Manual

DATE

Stalls Power–On

Flight At Critically Slow Airspeeds

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.1
☐ CFI Demonstration and Explanation	.5
☐ Pilot Application, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to aerodynamic factors associated with power–on stalls and how this relates to actual takeoff and departure situations.
- ☐ 2. Selects an entry altitude that allows the task to be completed no lower than 1,500 feet (460 meters) AGL or the manufacturer's recommended altitude, whichever is higher.
- ☐ 3. Establishes the takeoff or departure configuration and slows the airplane to normal lift-off speed.
- ☐ 4. Sets power to manufacturer's recommended power-on stall power setting while establishing the climb attitude (in the absence of a manufacturer recommended power setting, use no less than approximately 55/60 percent of full power as a guideline).
- ☐ 5. Maintains the specified heading ±10°, in straight flight; a 20° angle of bank, ±10°, in turning flight.
- ☐ 6. Recognizes and announces the onset of the stall by identifying the first aerodynamic buffeting or decay of control effectiveness.
- ☐ 7. Promptly recovers as the stall occurs by reducing the pitch attitude and simultaneously applying power according to the manufacturer's recommendation. Reduces drag as necessary.
- ☐ 8. Recovers to the point where adequate control effectiveness is regained with the minimum loss in altitude.
- ☐ 9. Allows the airplane to accelerate to the best angle-of-climb speed with simulated obstacles or the best rate-of-climb speed without simulated obstacles, and resumes the climb.

ELEMENTS

- ☐ 1. Stall recognition awareness
- ☐ 2. Control responsiveness, immediate
- ☐ 3. Flight control, smooth and coordinated
- ☐ 4. Performance (reaction) timing
- ☐ 5. Control of assigned headings
- ☐ 6. Power management as recommended
- ☐ 7. Safe entry altitude, and clear traffic area
- ☐ 8. Stall warning indications adherence
- ☐ 9. Ground proximity awareness
- ☐ 10. Airspeed control, avoid excessive gain

COMMON ERRORS

- ☐ 1. Configuration, failure to establish
- ☐ 2. Pitch, heading and/or bank incorrect
- ☐ 3. Control manner, rough or uncoordinated
- ☐ 4. Stall indications, failure to recognize
- ☐ 5. Excessive airspeed and altitude loss
- ☐ 6. Full stall, unsatisfactory performance
- ☐ 7. Torque correction, improper or delayed
- ☐ 8. Stall recovery, inappropriately delayed

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Advise pilot that airplane can stall at any airspeed, attitude, or power setting.
- ☐ 3. Direct pilot to read the section "Recognition of Stalls" in AC 61-21A.
- ☐ 4. Demonstrate and simultaneously explain the aerodynamics of approach to stalls, power–on (takeoff and departure configuration), and the relationship of various factors such as landing gear and flap configuration, weight, center of gravity, load factor, and bank angle to stall speed, while employing the above entry criteria. Explain the stall recognition cues, and at the first indication of buffeting, apply the above recovery methods immediately, and advise of minimum recovery altitude.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Recognition of Stalls" in AC 61-21A.
- ☐ 3. Practice stall recognition, entry, and recovery skills, with smooth control technique and avoid secondary stall or excessive airspeed, and/or unnecessary altitude loss, spin, and flight below 1,500 feet AGL. Make clearing turns to ensure the area is clear of any other air traffic.

COMPLETION STANDARDS

- ☐ 1. Pilot has described and performed the "approach to stall, power–on", maneuver as prescribed by the objective, and at the time of approach to stall recognition, immediate recovery was initiated by decreasing the angle of attack, and adjusting power, as necessary, to regain normal flight attitude and speed; thereafter avoiding full stall, and/or secondary stall.

REFERENCES

AC 61-21A	Flight Training Handbook (147)	AC 91-23	Pilot's Weight and Balance Handbook
VEOG	Factors Affecting Stall Speed #28	POH	Pilot's Operating Handbook
VEOG	Stall - Spin Awareness #59	AFM	Approved Airplane Flight Manual

DATE

Spin Awareness

Slow Flight and Stalls

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ CFI Demonstration and Explanation .5
- ☐ Pilot Application, Trial and Practice 1.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Weight and Balance Data
- ☐ Weather Reports, Flight Briefing, and NOTAMS
- ☐ Blackboard Or Graphics Pad
- ☐ Model Airplane Or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to spin dynamics by explaining –
   (a) the aerodynamic factors, including instrument indications, that occur in a spin.
   (b) the phases of a spin with regard to uncoordinated flight, the vertical and rotational velocities, and its rotation about the axis perpendicular to the earth's surface.

☐ 2. Exhibits knowledge of the elements related to spins by explaining –
   (a) flight situations where unintentional spins may occur.
   (b) the technique used to recognize and recover from unintentional spins.

ELEMENTS

- ☐ 1. Understanding the aerodynamics of AOA
- ☐ 2. Angle of Attack, controlled only by elevators
- ☐ 3. Rudder controls yawing about vertical axis
- ☐ 4. Ailerons produce primarily rolling moment
- ☐ 5. C.G. location and relationship to recovery
- ☐ 6. AFM spin recovery SOP, pilot familiarity
- ☐ 7. Instinctive and prompt reaction to high AOA
- ☐ 8. Misuse of controls and the consequence

COMMON ERRORS

- ☐ 1. Angle of attack (AOA) lack of understanding
- ☐ 2. Flight instrument lag, pilot lacks awareness
- ☐ 3. Pronounced stall warnings ignored
- ☐ 4. Slow and overly cautious control application
- ☐ 5. Rudder and ailerons crossed controlled
- ☐ 6. Pilot held controls with the spin, motionless
- ☐ 7. Turn recover procedures inadequate/unsafe
- ☐ 8. Ground proximity apprehension impediment

INSTRUCTOR'S ACTIONS

☐ 1. Direct pilot to read the Spins section in AC 61-21A, and Spin advisory or procedures in the AFM.

☐ 2. Advise pilot that the spin is an aggravated stall which results in autorotation. It is a motion in which an airplane whose wing is in a stalled condition descends rapidly towards the earth in a helical path, rotating about a vertical axis. Wing AOA in the spin are between stalling and 90°. The pitch attitudes may vary from level to vertically nose down to slightly inverted. The spinning motion is very complicated and involves simultaneous rolling, yawing, and pitching while the airplane is at high AOA and sideslip. The aerodynamic and inertial forces are in balance—which the pilot must upset in order to regain control. At the incipient point of the spin, the ASI will be well below stall speed, the TC will depict a wing low, fully deflected, and the AI will be on its side.

☐ 3. Advise pilot that the primary cause for unintentional spins is that due to fear, impulse, or poor judgment, pilot misuses the controls in striving to maneuver improperly, excessively, and abruptly while trying to recover from steep, skidding, turning flight, at low altitude, and spins into the ground.

☐ 4. Demonstrate and explain the inherent dangers of loss of control from excessive or abrupt maneuvering in slow flight or in a tight turn, and the AFM SOP for recovery from an incipient stall/spin.

PILOT'S ACTIONS

☐ 1. Complete above reading assignments, and study stall/spin recovery procedures in AFM.

☐ 2. Practice and actualize a precise understanding as to the actual aerodynamic effects that are created or caused by each of the flight controls when applied in a turning maneuver that is not materializing as expected, with an emphasis on immediately reducing the AOA, not on correcting attitude.

☐ 3. Practice with CFI developing instinctive reflexes, uninhibited by low altitude, to recognize and properly recover from incipient spins at critical altitudes, where AOA and flight control are preeminent.

COMPLETION STANDARDS

☐ 1. Pilot has thoroughly described and explained the aerodynamic factors and flight instrument indications that occur during the spin, including the three phases of the spin: incipient, developed, and the recovery, with the incipient phase occurring in approximately 4 to 6 seconds.

☐ 2. Pilot clearly described the primary situation that causes the inadvertent fatal spin, the steep (tight), slow, skidding turn, at critically low altitude, and the immediate instinctive properly sequenced recovery actions: 1. power to idle, 2. ailerons neutralize, 3. apply opposite rudder, 4. elevator control briskly moved forward, 5. as rotation stops, normal dive recovery, thereafter, apply power.

REFERENCES

FAA-RD-77-26	GA Pilot Stall Awareness Training Study	AC 61-67B	Stall and Spin Awareness Training
AC 61-21-A	Flight Training Handbook	AC 61-92	Use Of Distractions During Pilot Certification Flight Test

DATE

Emergency Descent

Emergency Operations

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Maneuver Objective and Preflight Instruction .2
- ☐ CFI Demonstration of Maneuver .2
- ☐ Directed Pilot Application and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"
- ☐ Weather Reports, Flight Briefing, and NOTAMS

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to an emergency descent.
- ☐ 2. Recognizes situations, such as decompression, cockpit smoke and/or fire, that require an emergency descent.
- ☐ 3. Establishes the prescribed airspeed and configuration for the emergency descent as recommended by the manufacturer without exceeding safety limitations.
- ☐ 4. Uses proper engine control settings.
- ☐ 5. Exhibits orientation, division of attention, and proper planning.
- ☐ 6. Recognizes the requirement to establish positive load factors during the descent.
- ☐ 7. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Emergency descent procedure familiarity
- ☐ 2. Type of terrain and altitude AGL awareness
- ☐ 3. Spiral or straight descent procedure decision
- ☐ 4. Airplane V-speed(s) limits and compliance
- ☐ 5. Use of propeller as an aerodynamic brake
- ☐ 6. Extend gear and flaps for maximum drag
- ☐ 7. Descent recovery sequence and procedure
- ☐ 8. Pilot judgment, decisions, and timing
- ☐ 9. Operate engine according to mfg's.E-SOP
- ☐ 10. Airplane systems and emergency procedures
- ☐ 11. Airplane's structrual and performance limits
- ☐ 12. Descent through clouds and instrument scan

COMMON ERRORS

- ☐ 1. Excessive airspeed for airplane configuration
- ☐ 2. Negative G-force produced
- ☐ 3. Emergency situation not recognized promptly
- ☐ 4. Disorientation, vertigo and dizziness
- ☐ 5. Uncertainty and indecision, debilitating
- ☐ 6. Unavailable fuel vs. airplane attitude ignored

INSTRUCTOR'S ACTIONS

- ☐ 1. Direct pilot to read the section "Descents (Emergency)" in both AC 61-21A, and the current AFM.
- ☐ 2. Advise pilot that every pressurized cabin airplane has in its AFM a recommended procedure for emergency descent that must be executed in the event of a explosive and/or rapid decompression.
- ☐ 3. Demonstrate and explain a pressurized airplane's AFM emergency descent procedure if available.
- ☐ 4. Advise pilot that most GA airplanes **do not** have an "emergency descent procedure" in the AFM. Therefore, in the the event of an emergency, such as smoke and/or fire that requires an emergency descent, the pilot must know all of the applicable V-speeds for the airplane. Then demonstrate an emergency descent, both spiral and straight, while stressing the importance of establishing a positive load factor, and not compromising the aerodynamic and/or design factors of the airplane.
- ☐ 5. Demonstrate how the airplane should be configured to achieve the maximum rate of descent within the published limits: power set to idle, gear and flaps down, and extend speed brakes or spoilers. Caution pilot that under no circumstance should the V-speeds be exceeded. Pilot's informed judgment, errorless planning, and immediate execution of the emergency descent are essential.

PILOT'S ACTIONS

- ☐ 1. Complete the above reading assignment. Become thoroughly familiar with all of the airplane's systems and the emergency procedures for each, including all of the design V-speed limitations.
- ☐ 2. Review all of the essential criteria required for competent decisions, such as the magnitude of the emergency, weather, altitude, terrain, O_2 available, type of descent – spiral or straight, etc.
- ☐ 3. Practice the proper sequence of actions including entry techniques to insure positive load factors while making a rapid emergency descent, including (pitch and power) airspeed control.

COMPLETION STANDARDS

- ☐ 1. Pilot demonstrated understanding of emergency situations that would dictate an emergency descent such as decompression, smoke and/or fire, and the AFM emergency procedure, or aircraft V-speeds that govern pilot actions in executing the emergency descent, and the absolute prohibition against exceeding the design limits of the airplane.
- ☐ 2. Pilot performed an emergency descent by taking the immediate action as dictated by the urgency of the situation(s), and employed the AFM's E-SOP while using skillful planning, orientation, coordination, smoothness, airspeed control, and simultaneously followed all checklist items and cautions.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 61-21A	Flight Training Handbook (160)	AFM	Approved Airplane Flight Manual

DATE

Emergency Approach and Landing (Simulated)

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ CFI Demonstration and Explanation .5
- ☐ Pilot Application, Trial and Practice 1.0
- ☐ Postflight Critique and Discussion .5
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Pilot's Operating Handbook (POH)
- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to emergency approach and landing procedures.
- ☐ 2. Establishes and maintains the recommended best-glide airspeed, ±10 knots, and configuration during simulated emergencies.
- ☐ 3. Selects a suitable landing area, considering the possibility of an actual forced landing.
- ☐ 4. Attempts to determine the reason for the simulated malfunction.
- ☐ 5. Plans and follows a flight pattern to the selected landing area, considering altitude, wind, terrain, obstructions, and other factors.
- ☐ 6. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Best glide airspeed as recommended
- ☐ 2. Manufacturer's suggested configuration
- ☐ 3. Approach, speed, planning and execution
- ☐ 4. Selection of appropriate landing area
- ☐ 5. Emergency cockpit procedures
- ☐ 6. Checklist is strongly recommended
- ☐ 7. Approach accuracy techniques
- ☐ 8. Flight control application and coordination
- ☐ 9. Emergency radio transmissions
- ☐ 10. Wind direction and velocity estimate
- ☐ 11. Available altitude management
- ☐ 12. Terrain suitability vs. configuration

COMMON ERRORS

- ☐ 1. Airspeed recommendation not maintained
- ☐ 2. Selection of landing area inappropriate
- ☐ 3. Wind direction/speed estimation wrong
- ☐ 4. Pattern procedure utilized, inappropriate
- ☐ 5. Uncertainty, indecision, or apprehension
- ☐ 6. Planning and timing late or inadequate
- ☐ 7. Checklist and/or item(s) bypassed
- ☐ 8. Trying to stretch the glide
- ☐ 9. Eagerness to land caused extreme speed
- ☐ 10. Misunderstanding who is PIC
- ☐ 11. Under/overshooting selected landing area
- ☐ 12. Flight control application uncoordinated

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Instruct pilot that the PIC must have a comprehensive understanding of the AFM, and emergency procedures for each airplane that is to be flown, prior to flight, as required by CFR.
- ☐ 3. Demonstrate and explain emergency approach and landing (simulated) procedures as recommended in the AFM or POH. Additionally, present the following: immediately upon engine failure, establish best angle of glide airspeed, and trim airplane. Determine wind direction, select suitable landing area promptly, and assuredly within available gliding range. Check for obstructions, and be especially alert for power lines, and note type of terrain. Once the glide is set up, including trim, field selection made, and airplane headed directly for it, attempt to determine cause of power failure and restart engine. Pilot must methodically perform the cockpit checklist procedures as stated in the AFM or POH. It only takes about 15 seconds to complete check. At a rate of descent of 600 FPM, the altitude lost for this check is 150 feet. Stress quick utilization and adherence to checklist procedures. In the absence of a restart set up a landing approach such as 180°, side approach, or spiralling 360° overhead approach.
- ☐ 4. Supervise pilot's practice of emergency approach and landing (simulated).

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Emergency Approaches (Simulated)" in AC 61-21A.
- ☐ 3. Complete supervised practice of simulated emergency approaches and landings, using manufacturer's recommended checklist, and complying with CFR's.

COMPLETION STANDARDS

- ☐ 1. Pilot has performed emergency approach and landing (simulated), down to MSA, while adhering to all of the objective criteria with skillful flight proficiency.

REFERENCES

AC 60-14	Aviation Instructor's Handbook	AFM	Approved Airplane Flight Manual
AC 61-21A	Flight Training Handbook (116)	CFR	91.13, 91.119
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge		

DATE

Systems and Equipment Malfunctions

Emergency Operations

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Preflight Instruction .1
- ☐ Instructor Demonstration .2
- ☐ Directed Pilot Application and Practice .5
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to causes, indications, and pilot actions for various systems and equipment malfunctions.

☐ 2. Analyzes the situation and takes appropriate action for simulated emergencies, pertinent to –

(a) importance of availability and use of an emergency checklist.
(b) partial power loss.
(c) engine failure during various phases of flight.
(d) engine roughness or overheat.
(e) loss of oil pressure.
(f) fuel starvation.
(g) smoke and fire.
(h) icing.
(i) pressurization.
(j) pilot static/vacuum system and associated flight instruments.
(k) electrical.
(l) landing gear.
(m) flaps (asymmetrical position).
(n) inadvertent door opening.
(o) emergency exits.
(p) any other emergency unique to the airplane flown.

ELEMENTS

- ☐ 1. Recognition of emergency
- ☐ 2. Attempt to correct malfunctions
- ☐ 3. Adoption of alternate procedures
- ☐ 4. Systems and component familiarity
- ☐ 5. Manufacturer's checklist
- ☐ 6. Observation of indicators and gauges
- ☐ 7. Emergency radio procedures
- ☐ 8. Emergency transponder codes

COMMON ERRORS

- ☐ 1. Inaccurate analysis of malfunction
- ☐ 2. Precipitous action without due reasoning
- ☐ 3. Ignoring effective alternate action
- ☐ 4. Failure to act in time
- ☐ 5. Systems familiarity inadequate
- ☐ 6. Checklist and/or item(s) bypassed

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Direct pilot to read the section "Emergency Procedures" in AFM and/or POH.
- ☐ 3. Instruct pilot that in-flight emergencies created by the failure or malfunction of one or more systems or components may be broadly classified in one of two groups: those requiring immediate action or those which allow sufficient time for thoughtful consideration of the situation before remedial action is initiated.
- ☐ 4. Demonstrate and simultaneously explain the recognition of emergencies, which demand an immediate corrective action, and are governed by manufacturer's recommended procedures checklist, for ease of familiarization and application, such as: engine failure, engine compartment fire, fuel starvation, carburetor or induction icing, etc. Insist that pilot commit to memory the checklist procedures for an in-flight engine failure, just after takeoff, or en route.
- ☐ 5. Demonstrate other emergencies, which do not demand immediate action but are inherent with the in-flight operation of single-engine airplanes with respect to probable cause, effect, and best corrective action to improve the problem, or abnormalities of function safely.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Emergency Procedures" in AFM and/or POH.
- ☐ 3. Complete supervised practice of identifying and resolving simulated emergencies.

COMPLETION STANDARDS

☐ 1. Pilot has experienced, identified, and explained in-flight malfunctions, and determined the immediacy of the problem(s) and/or emergency, and skillfully employed the remedial action (manufacturer's recommended checklist procedure) appropriate to the situation competently. Pilot has committed to memory, procedures for engine failure at takeoff and en route.

REFERENCES

AC 60-14	Aviation Instructor's Handbook
AC 61-16A	Flight Instructor's Handbook
AC 61-21A	Flight Training Handbook (117)
AC 20-105A	Engine Power-Loss Accident Prevention
AC 20-118A	Emergency Evacuation Demonstration From Small Airplanes

DATE

Emergency Equipment and Survival Gear

Emergency Operations

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Maneuver Objective and Preflight Instruction .2
- ☐ CFI Demonstration of Equipment and Procedures .2
- ☐ Directed Pilot Application and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Blackboard or Graphics Pad
- ☐ Emergency Survival Kit and Instructions
- ☐ Hand Fire Extinguishers For Use In Aircraft
- ☐ Flashlight and Extra Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to emergency equipment appropriate to the airplane used for the practical test by describing –
   (a) location in the airplane.
   (b) method of operation.
   (c) servicing requirements.
   (d) method of safe storage.

☐ 2. Exhibits knowledge of the elements related to survival gear by describing –
   (a) survival gear appropriate for operation in various climatological and topographical environments.
   (b) location in the airplane.
   (c) method of operation.
   (d) servicing requirements.
   (e) method of safe storage.

ELEMENTS

☐ 1. Emergency equipment passenger briefing
☐ 2. Route planning vs. survival risk factors
☐ 3. Hazardous area reporting service
☐ 4. Search and rescue facilities

COMMON ERRORS

☐ 1. Available emergency information not utilized
☐ 2. Passenger briefing inadequate or ignored
☐ 3. Risk contingencies erroneously calculated
☐ 4. Operating instructions unfamiliar to pilot

INSTRUCTOR'S ACTIONS

☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
☐ 2. Direct pilot to read the section "Emergency Procedures" in AFM and/or POH.
☐ 3. Exhibit and explain to the pilot the reason for and the location of all emergency equipment aboard the airplane, required and optional, including the method of operation, servicing requirement pursuant to CFR's, AC's, or AD's, the cautions to be exercised in the storage to prevent any form of degradation of the equipment and insure easy access in the event of an emergency landing.
☐ 4. Advise pilot that this is an extremely broad and critically important subject area, given the fact that an emergency landing may occur at any time or place on earth, day or night, winter or summer. This is an enormous contingency that the pilot must be continuously prepared for. The risk factor can only be minimized by prudent route planning, weather condition(s) consistent with pilot experience, type of airplane, and a selection of appropriate equipment and provisions to insure the survival of all SOB, given the climates and global environments the flight may transition. Furthermore it is the pilot's responsibility to brief all SOB as to the location of emergency survival equipment, including operation instruction, in the event the pilot is incapacitated.

PILOT'S ACTIONS

☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
☐ 2. Complete the above reading assignment and the below listed references.
☐ 3. Verify location and operating procedures of all the emergency equipment, by making an inspection of the airplane, and insure that emergency equipment items are properly stored or secured.
☐ 4. Prepare lists of appropriate survival gear for several hypothetical flights, for different climates and over diverse global areas, such as ocean routes, mountainous and arctic areas, and desert terrain.

COMPLETION STANDARDS

☐ 1. Pilot has exhibited knowledge by thoroughly explaining the locations, methods of operation, servicing requirements, and proper storage of emergency equipment for the current airplane in use, such as ELT, flashlight, battery powered radio, hand fire extinguishers for use in aircraft, etc.
☐ 2. Pilot has exhibited knowledge by explaining the relationship between the remoteness of the area of flight and essential survival equipment that should be aboard the airplane, and the responsibility of the pilot to be prepared to provide the appropriate survival gear in the event of an emergency.

REFERENCES

AC 61-21A	Flight Training Handbook
AC 90-79	Recommended Practices and Procedures Long-Range Navigation Equipment
AC 90-91	National Route Program
AC 91-49	General Aviation Procedures for North Atlantic Minimum Navigation Performance Specifications Airspace
AC 20-42C	Hand Fire Extinguishers For Use In Aircraft
AC 20-118A	Emergency Evacuation Demonstration From Small Airplanes
AC 23-807-3	Emergency Exits Openable From Outside For Small Airplanes
AC 91-44A	Operational And Maintenance Practices For Emergency Locator Transmitters And Receivers
AC 91-58	Use Of Pyrotechnic Visual Distress Signaling Devices In Aviation
AC 120-47	Survival Equipment For Use In Overwater Operations

DATE

Supplemental Oxygen (O_2)

High Altitude Operations

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ CFI Demonstration and Explanation .3
- ☐ Pilot Application, Trial and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Pressurized Complex Single-Engine
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ O_2 Duration Chart
- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ O_2 System(s), Safety and Operating Instructions
- ☐ Aeronautical Information Manual (AIM)

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to supplemental oxygen by explaining –

(a) regulatory requirements for use of supplemental oxygen.

(b) distinctions between "aviators' breathing oxygen" and other types.

(c) method of determining oxygen service availability.

(d) operational characteristics of continuous flow, demand, and pressure-demand oxygen systems.

(e) care and storage of high-pressure oxygen bottles.

ELEMENTS

- ☐ 1. O_2 equipment securely stored and anchored
- ☐ 2. O_2 cylinders, pressure (PSI) and capacity
- ☐ 3. O_2 flow indicator(s) and pilot monitoring
- ☐ 4. O_2 readily accessible to pilot and SOB
- ☐ 5. Proper O_2 mask type and utilization
- ☐ 6. O2 system FAA inspection(s) and records
- ☐ 7. Hazards of oils and grease with O_2
- ☐ 8. O_2 starvation vs. fuel starvation dangers

COMMON ERRORS

- ☐ 1. Breathing assures adequate O_2 in the system
- ☐ 2. Excessive and/or prolonged O_2 use
- ☐ 3. Depletion of O_2 unnoticed or corrected
- ☐ 4. Insidious effects of hypoxia unappreciated

INSTRUCTOR'S ACTIONS

☐ 1. Explain all of the regulations regarding pilots' use of O_2 and availability to all SOB at the following altitudes; 12,500, 14,000, and 15,000 ft. MSL, including pressurized airplane O_2 requirements .

☐ 2. Explain and ensure that pilot understands that industrial O_2 has impurities and water, and that medical O_2 has water vapor, only aviators' breathing O_2 which is 99.5% O_2 pure is authorized.

☐ 3. Demonstrate and simultaneously explain the continuous O_2 flow system, which is characterized by the rebreather bag attached to mask that mixes 100% O_2 with part of O_2 exhaled. This system is used up to FL 250. Next, the Demand (Diluter) O_2 system which furnishes O_2 to the user when they inhale from the face mask, the amount of O_2 automatically increases with altitude, and system is usable up to FL 350. Lastly the Pressure-Demand O_2 system which presents a new experience in breathing habits by delivering the O_2 under positive pressure to an air–tight and O_2 tight mask-to-face seal. The pilot will find inhaling is effortless because of the positive pressure; however, conscious effort must be exerted to exhale, and pilot may find it difficult to talk.

☐ 4. Demonstrate and simultaneously explain how the pilot can determine if O_2 refilling and/or replacement service is available at a particular airport by use of the Airport/Facility Directory. Utilize the Mfg's. recommended checklist for the specific equipment being used to ensure that the pilot uses and/or monitors the O_2 system properly to avoid the consequence of SOB O_2 deficiency.

☐ 5. Conduct lesson completion critique, and question and answer period. Preview next flight lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Study all pertinent regulations regarding supplemental O_2, including effects of altitude on SOB.
- ☐ 3. Make notes about the specifications of aviators' O_2 and high-pressure of 1800/2200 psi systems.
- ☐ 4. Practice inspecting, testing and using O_2 systems, including mask types, flow indicators, and regulators, and locating service availability at airport in the data section of the A/FD.

COMPLETION STANDARDS

☐ 1. Pilot exhibited comprehension and understanding of the required use of supplemental O_2 by pilot and passengers at specific altitudes by a thorough explanation of the regulations.

☐ 2. Pilot completed an inspection and demonstration of the O_2 system, including mask, pressure bottles, flow indicators in the tubing, aviation O_2 specifications, regulator, and utilization of checklist.

☐ 3. Pilot exhibited knowledge of the oxygen system types by explaining in detail the characteristics of the following three systems: continuous flow, demand, and pressure-demand oxygen systems.

REFERENCES

CFR, Part 91	General Operating and Flight Rules	AC 61-107	Operations Of Aircraft At Altitudes Above FL 250 MSL and/Or Mach Greater Than .75
VEOG	Oxygen, Use Of In General Aviation Aircraft No. 49	AC 120-43	The Influence Of Beards On Oxygen Mask Efficiency
AFD	Airport/Facility Directory		

DATE

Pressurization

High Altitude Operations

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ CFI Demonstration and Explanation .5
- ☐ Pilot Application, Trial and Practice 1.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Pressurized Complex Single-Engine
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Title 14 of the Code of Federal Regulations (CFR)
- ☐ Cabin-Pressurization SOP
- ☐ Aeronautical Information Manual (AIM)

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits knowledge of the elements related to pressurization by explaining –

(a) regulatory requirements for use of pressurized airplane systems.

(b) operational characteristics of the cabin-pressure control system.

(c) physiological hazards associated with high altitude flight and decompression.

(d) operational and physiological reasons for completing emergency descents.

(e) need for wearing safety belts and for rapid access to supplemental oxygen.

☐ 2. Operates the pressurization system properly, and reacts promptly and properly to pressurization malfunctions.

ELEMENTS

- ☐ 1. Pressure system terminology & familiarization
- ☐ 2. Transition to pressurization airplane
- ☐ 3. Constant air inflow, variable air outflow
- ☐ 4. AFM/E-SOP for pressurization malfunctions
- ☐ 5. Health hazards vs. rapid decompression
- ☐ 6. Pressure system failure warning indicators
- ☐ 7. Emergency oxygen system, briefing to SOB
- ☐ 8. Physiological training program participation

COMMON ERRORS

- ☐ 1. Pressure system, failure to monitor controls
- ☐ 2. Emergency procedures belatedly employed
- ☐ 3. Hypoxia, failure to recognize
- ☐ 4. Slow undetected decompression

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the essential knowledge and performance criteria.
- ☐ 2. Direct pilot to read "Pressurized Airplane" and "OPERATION OF AIRCRAFT AT ALTITUDE ABOVE 25,000 FEET MSL AND/OR MACH NUMBERS (Mno) GREATER THAN .75" in AC 61-21A and AC 61-107 respectfully.
- ☐ 3. Instruct thoroughly about all physiological aspects of high altitude flight: respiration; effects, symptoms, and causes of hypoxia, and any other high altitude sicknesses; time of useful consciousness (TUC) without supplemental oxygen; effects of prolonged usage of supplemental oxygen (toxic symptoms); causes, effect, and preventive measures for gas expansion and gas bubble formation.
- ☐ 4. Demonstrate if applicable by use of the manufacturer's recommendations (AFM/SOP), the operation of the pressurization system and the timely and proper reactions to pressurization malfunctions.
- ☐ 5. Explain and insure that pilot has a fundamental understanding of an actual or typical pressurized cabin system, including atmosphere comfort design principles, primary components, functions, controls, instruments, and warning indicators; emergency procedures due to explosive decompression.
- ☐ 6. Explain and insure that pilot has a thorough awareness of the physical suffering caused by explosive or rapid decompression, and the necessary and immediate initiation of an emergency descent to minimize the effects of hypoxia, decompression sickness, trapped/evolved gas sickness, the bends, shock, vision deterioration, respiration problems, and/or unconsciousness.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Complete above reading assignments; read and/or study Medical Facts For Pilots in the the AIM.
- ☐ 3. Study all the critical factors regarding the special physiological consideration which must be given to flight operations in the high-altitude environment, which has different effects on the human body than those experienced at the lower altitudes, and the Effective Performance Time (EPT) for all SOB.
- ☐ 4. Study operational characteristics of the cabin-pressure system, and practice utilization of system controls, and simulated emergency descents, while adhering to AFM/SOP, if applicable.

COMPLETION STANDARDS

- ☐ 1. Pilot has proven his comprehensive knowledge of the objective by thoroughly and accurately explaining a cabin-pressure system, potential health hazards of high altitude flight, reason(s) for use of safety belts, emergency descents, and the immediate utilization of supplemental oxygen.
- ☐ 2. Pilot has correctly operated a cabin-pressure system, and responded promptly and competently to all types of pressurization malfunctions, including the use of supplemental oxygen, if applicable.

REFERENCES

AC 23.841-1	Cabin Pressurization Systems In Small Airplanes		Mach Numbers (Mno) Greater Than .75.
AC 61-21A	Flight Training Handbook (249)	14 CFR	Part 61, and Part 91
AC 61-107	Operations Of Aircraft At Altitudes Above 25,00 Feet MSL And/Or	AIM	Aeronautical Information Manual

DATE

After Landing Procedures

Postflight Procedures

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Explanation of Checklist Items .2
- ☐ Demonstration of Checklist Items .2
- ☐ Pilot Application, Trial and Practice .5
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ Manufacturer's Recommended Checklist
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Airport Facility Directory
- ☐ Blackboard or Graphics Pad
- ☐ Model Airplane or "Handees"

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to after-landing procedures, including local and ATC procedures.
- ☐ 2. Selects a suitable parking area while considering proper wind correction technique and obstacle clearance.
- ☐ 3. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Safety precautions emphasized
- ☐ 2. Speed control, departing active runway
- ☐ 3. Flight control position versus wind effect
- ☐ 4. Manufacturer's recommended checklist
- ☐ 5. Parking area, safe and hazard protected
- ☐ 6. Cockpit inspection, note discrepancies
- ☐ 7. Cockpit control locks installed
- ☐ 8. Securing systems, windows and doors
- ☐ 9. ELT, verify that it was not activated
- ☐ 10. Postflight walk-around inspection
- ☐ 11. Engine and components inspection
- ☐ 12. Service and maintenance request
- ☐ 13. Pilot logbook, post flight data immediately
- ☐ 14. Flight plan closed punctually

COMMON ERRORS

- ☐ 1. Landing gear retraction versus flaps, error
- ☐ 2. Taxiing and turning at excessive speeds
- ☐ 3. Checklist and/or item(s) bypassed
- ☐ 4. Parked, inappropriate or hazardous area
- ☐ 5. Flaps, failed to retract
- ☐ 6. Master switch, failed to turn off
- ☐ 7. Control locks, failed to install properly
- ☐ 8. Postflight inspection incomplete
- ☐ 9. Tie-down techniques unsatisfactory
- ☐ 10. Flight plan closing forgotten

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Explain that a flight is not complete until the engine is shut down and the airplane secured.
- ☐ 3. Demonstrate and simultaneously explain the postflight procedures for taxiing to a designated or suitable parking area, considering wind, obstructions, ground personnel, prop blast, and parking the airplane properly. Then use the manufacturer's recommended checklist to shut down the engine and cockpit equipment, instruments, avionics and control locks.
- ☐ 4. Demonstrate a common courtesy policy (second only to prudent safety standards) of conducting a thorough postflight inspection. Discover problems before they become preflight time consuming and/or cancellation predicaments at the next scheduled flight.
- ☐ 5. Demonstrate recording discrepancies and advising the responsible or appropriate personnel.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Practice the correct procedure for taxiing to a designated or suitable parking area considering wind, obstructions, and open hangar doors, etc., and parking the airplane properly.
- ☐ 3. Practice using the manufacturer's recommended checklist to shut down the engine and cockpit equipment, instruments, avionics and install control locks.
- ☐ 4. Practice how to conduct a satisfactory postflight inspection. Preview next flight lesson.

COMPLETION STANDARDS

- ☐ 1. Pilot is aware that the after-landing check should be performed only after the airplane is brought to a complete stop clear of the active runway.
- ☐ 2. Pilot has demonstrated and explained the correct procedures used to taxi to the designated parking area, maintained the proper position for the flight controls, parked the airplane properly, and safely deplaned passengers.
- ☐ 3. Pilot has explained and demonstrated that because of different features and equipment in various airplanes, the after-landing checklist provided by the manufacturer should be used.
- ☐ 4. Pilot has secured the airplane and performed a satisfactory postflight inspection.

REFERENCES

AC 61-21A	Flight Training Handbook (pg. 57)	AFD	Airport Facility Directory
AFM	Approved Airplane Flight Manual	AC 00-34A	Aircraft Ground Handling and Servicing

DATE

Parking and Securing Airplane

Postflight Procedure

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Explanation of Procedures and Checklist Items .2
- ☐ CFI Demonstration of Manufacturer's SOP .3
- ☐ Pilot Application, Trial and Practice .7
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Complex Single-Engine (Airworthy)
- ☐ Manufacturer's Recommended Checklist
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Airport Facility Directory
- ☐ Tiedown Ropes and Control Locks With Streamers
- ☐ Wheel Chocks For All Gear Locations

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits knowledge of the elements related to ramp safety, parking hand signals, shutdown, securing, and postflight inspection.
- ☐ 2. Parks the airplane properly, considering the safety of nearby persons and property.
- ☐ 3. Follows the recommended procedure for engine shutdown and securing the cockpit and the airplane.
- ☐ 4. Secures the airplane properly.
- ☐ 5. Performs a satisfactory postflight inspection.
- ☐ 6. Completes the prescribed checklist.

ELEMENTS

- ☐ 1. Safety precautions must be emphasized
- ☐ 2. Ramp/parking area familiarity or diagram
- ☐ 3. Three point tiedown procedures encouraged
- ☐ 4. Nosewheel vs. tailwheel security techniques
- ☐ 5. Antislip knots, like bowline or square knots
- ☐ 6. Passenger transit area briefing and security
- ☐ 7. Tiedown rope and tensile strength inspection
- ☐ 8. External control lock(s) and red caution flags

COMMON ERRORS

- ☐ 1. Master switch, neglected to turn off
- ☐ 2. Equipment discrepancies, failed to note
- ☐ 3. Signalman's uniform hand signs ignored
- ☐ 4. Wheel chocks, and tie downs, not secure
- ☐ 5. Visual inspection and checklist incomplete
- ☐ 6. Tiedown rope not inspected for rot/wear
- ☐ 7. Used struts inappropriately for tiedown
- ☐ 8. Control locks - failed to install properly
- ☐ 9. Control locks - failed to remove for flight
- ☐ 10. Nosewheel (gear) tiedown ignored
- ☐ 11. Airplane position vs. wind inappropriate
- ☐ 12. Passenger deplaned in a hazardous fashion

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss lesson objective, and the required knowledge and performance criteria.
- ☐ 2. Direct pilot to read the AC 00-34C Aircraft Ground Handling and Servicing, AC 20-35C Tiedown Sense, and the After Landing Check, Engine Shutdown Check, and Ground Safety in, AC 61-21A.
- ☐ 3. Explain to the pilot to guard against relaxing vigilance after a flight and during ground operations. Also, demonstrate the proper procedures and techniques for ramp safety, understanding hand signals for parking, engine shut-down checklist, securing the cockpit, deplaning passengers, securing the airplane: such as locking doors, installing tiedowns, wheel chocks and control surface locks, complete post-flight exterior visual inspection and checklist, and arrange for the required servicing.
- ☐ 4. Caution pilot regarding the setting of parking brakes, and possible towing by FBO ramp personnel.
- ☐ 5. Insure that the pilot understands the importance of the parking position in relation to prevailing winds, airport environment, and the movement of other aircraft for protection and security of airplane. Additionally passengers must be briefed and/or directed regarding their movement/safety.

PILOT'S ACTIONS

- ☐ 1. Complete the above reading assignment and the below listed references documents.
- ☐ 2. Practice securing different types of airplanes, such as nosewheel vs. tailwheel, etc., with tiedowns and wheel chocks at all gear locations on different surfaces, such as areas paved with concrete or asphalt, with tiedown anchors, or unpaved turf areas, at different airports, insuring that the methods used would preclude damage from sudden wind or storms, including the covering of engine intake and exhaust, pitot-static tubes and vents, to prevent damage or entry of foreign matter.
- ☐ 3. Habitually review the SOP for "Securing Airplane" in the AFM for each airplane operated.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated knowledge of the above task by locating the correct parking area and responding properly to ramp signalman, insuring safe towing procedures are followed and explained the necessity for parking the airplane in the best position, considering passenger safety, weather hazard potential, and airport environment for several different airplanes and airports.
- ☐ 2. Pilot has competently performed all the of the required duties, tasks, and inspection(s) necessary to insure safe and proper parking, passenger deplaning, and securing and servicing of the airplane pursuant to local airport SOP, and the manufacturer's recommendations as published in the AFM.

REFERENCES

AC 61-21A	Flight Training Handbook (57)	AC 00-34A	Aircraft Ground Handling and Servicing
AFM	Approved Airplane Flight Manual	AC 20-35C	Tiedown Sense
AFD	Airport Facility Directory		

Title 14 of the Code of Federal Regulations (14 CFR) Part 61

Commercial Pilot (Airplane Single-Engine Land) FAA Eligibility Requirements

Adapted Excerpts

Subpart F

§61.121 APPLICABILITY

This subpart prescribes the requirements for the issuance of commercial pilot certificates and ratings, the conditions under which those certificates and ratings are necessary, and the general operating rules for persons who hold those certificates and ratings.

§61.123 ELIGIBILITY REQUIREMENTS: GENERAL

To be eligible for a commercial pilot certificate, a person must:

(a) Be at least 18 years of age;

(b) Be able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, then the Administrator may place such operating limitations on that applicant's pilot certificate as are necessary for the safe operation of the aircraft.

(c) Receive a logbook endorsement from an authorized instructor who:
  (1) Conducted the required ground training or reviewed the person's home study on the aeronautical knowledge areas listed in §61.125 of this part that apply to the aircraft category and class rating sought; and
  (2) Certified that the person is prepared for the required knowledge test that applies to the aircraft category and class rating sought.

(d) Pass the required knowledge test on the aeronautical knowledge areas listed in §61.125 of this part;

(e) Receive the required training and a logbook endorsement from an authorized instructor who:
  (1) Conducted the training on the areas of operation listed in §61.127(b) of this part that apply to the aircraft category and class rating sought; and
  (2) Certified that the person is prepared for the required practical test.

(f) Meet the aeronautical experience requirements of this subpart that apply to the aircraft category and class rating sought before applying for the practical test;

(g) Pass the required practical test on the areas of operation listed in §61.127(b) of this part that apply to the aircraft category and class rating sought;

(h) Hold at least a private pilot certificate issued under this part or meet the requirements of §61.73; and

(i) Comply with the sections of this part that apply to the aircraft category and class rating sought.

§61.125 AERONAUTICAL KNOWLEDGE

(a) General. A person who applies for a commercial pilot certificate must receive and log ground training from an authorized instructor, or complete a home-study course, on the aeronautical knowledge areas of paragraph (b) of this section that apply to the aircraft category and class rating sought.

(b) Aeronautical knowledge areas.
  (1) Applicable Federal Aviation Regulations of this chapter that relate to commercial pilot privileges, limitations, and flight operations;
  (2) Accident reporting requirements of the National Transportation Safety Board;
  (3) Basic aerodynamics and the principles of flight;
  (4) Meteorology to include recognition of critical weather situations, windshear recognition and avoidance, and the use of aeronautical weather reports and forecasts;
  (5) Safe and efficient operation of aircraft;
  (6) Weight and balance computations;
  (7) Use of performance charts;
  (8) Significance and effects of exceeding aircraft performance limitations;
  (9) Use of aeronautical charts and a magnetic compass for pilotage and dead reckoning;
  (10) Use of air navigation facilities;
  (11) Aeronautical decision making and judgment;
  (12) Principles and functions of aircraft systems;
  (13) Maneuvers, procedures, and emergency operations appropriate to the aircraft;
  (14) Night and high-altitude operations;
  (15) Procedures for operating within the National Airspace System; and
  (16) Procedures for flight and ground training for lighter-than-air ratings.

§61.127 FLIGHT PROFICIENCY

(a) General. A person who applies for a commercial pilot certificate must receive and log ground and flight training from an authorized instructor on the areas of operation of this section that apply to the aircraft category and class rating sought.

(b) Areas of operation.
  (1) For an airplane category rating with a single- engine class rating:
    (i) Preflight preparation;
    (ii) Preflight procedures;
    (iii) Airport and seaplane base operations;
    (iv) Takeoffs, landings, and go-arounds;
    (v) Performance maneuvers; ♦

(vi) Ground reference maneuvers;
(vii) Navigation;
(viii) Slow flight and stalls;
(ix) Emergency operations;
(x) High-altitude operations; and
(xi) Postflight procedures.

§61.129 AERONAUTICAL EXPERIENCE

(a) For an airplane single-engine rating. Except as provided in paragraph (i) of this section, a person who applies for a commercial pilot certificate with an airplane category and single-engine class rating must log at least 250 hours of flight time as a pilot that consists of at least:
(1) 100 hours in powered aircraft, of which 50 hours must be in airplanes.
(2) 100 hours of pilot-in-command flight time, which includes at least–
(i) 50 hours in airplanes; and
(ii) 50 hours in cross-country flight of which at least 10 hours must be in airplanes.
(3) 20 hours of training on the areas of operation listed in §61.127(b)(1) of this part that includes at least–
(i) 10 hours of instrument training of which at least 5 hours must be in a single-engine airplane;
(ii) 10 hours of training in an airplane that has a retractable landing gear, flaps, and a controllable pitch propeller, or is turbine-powered, or for an applicant seeking a single-engine seaplane rating, 10 hours of training in a seaplane that has flaps and a controllable pitch propeller;
(iii) One cross-country flight of at least 2 hours in a single-engine airplane in day VFR conditions, consisting of a total straight-line distance of more than 100 nautical miles from the original point of departure;
(iv) One cross-country flight of at least 2 hours in a single-engine airplane in night VFR conditions, consisting of a total straight-line distance of more than 100 nautical miles from the original point of departure; and
(v) 3 hours in a single-engine airplane in preparation for the practical test within the 60-day period preceding the date of the test.
(4) 10 hours of solo flight in a single-engine airplane on the areas of operation listed in §61.127(b)(1) of this part, which includes at least–
(i) One cross-country flight of not less than 300 nautical miles total distance, with landings at a minimum of three points, one of which is a straight-line distance of at least 250 nautical miles from the original departure point. However, if this requirement is being met in Hawaii, the longest segment need only have a straight-line distance of at least 150 nautical miles; and
(ii) 5 hours in night VFR conditions with 10 takeoffs and 10 landings (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower.

(i) Permitted credit for use of a flight simulator or flight training device.
(1) Except as provided in paragraph (i)(2) of this section, an applicant who has not accomplished the training required by this section in a course conducted by a training center certificated under part 142 of this chapter may:
(i) Credit a maximum of 50 hours toward the total aeronautical experience requirements for an airplane or powered-lift rating, provided the aeronautical experience was obtained from an authorized instructor in a flight simulator or flight training device that represents that class of airplane or powered-lift category and type, if applicable, appropriate to the rating sought.
(2) An applicant who has accomplished the training required by this section in a course conducted by a training center certificated under part 142 of this chapter may:
(i) Credit a maximum of 100 hours toward the total aeronautical experience requirements of this section for an airplane and powered-lift rating, provided the aeronautical experience was obtained from an authorized instructor in a flight simulator or flight training device that represents that class of airplane or powered-lift category and type, if applicable, appropriate to the rating sought; and
(3) Except when fewer hours are approved by the Administrator an applicant for a commercial pilot certificate with an airplane or a powered-lift rating who has satisfactorily completed an approved commercial pilot course conducted by a training center certificated under part 142 of this chapter need only have 190 hours of total aeronautical experience to meet the requirements of this section.

§61.131 EXCEPTIONS TO THE NIGHT FLYING REQUIREMENTS

(a) Subject to the limitations of paragraph (b) of this section, a person is not required to comply with the night flight training requirements of this subpart if the person receives flight training in and resides in the State of Alaska.
(b) A person who receives flight training in and resides in the State of Alaska but does not meet the night flight training requirements of this section:
(1) May be issued a pilot certificate with the limitation "night flying prohibited."
(2) Must comply with the appropriate night flight training requirements of this subpart within the 12-calendar-month period after the issuance of the pilot ♦

certificate. At the end of that period, the certificate will become invalid for use until the person complies with the appropriate night flight training requirements of this subpart. The person may have the "night flying prohibited" limitation removed if the person–

(i) Accomplishes the appropriate night flight training requirements of this subpart; and

(ii) Presents to an examiner a logbook or training record endorsement from an authorized instructor that verifies accomplishment of the appropriate night flight training requirements of this subpart.

§61.133 COMMERCIAL PILOT PRIVILEGES AND LIMITATIONS

(a) Privileges.

(1) General. A person who holds a commercial pilot certificate may act as pilot in command of an aircraft–

(i) Carrying persons or property for compensation or hire, provided the person is qualified in accordance with this part and with the applicable parts of this chapter that apply to the operation; and

(ii) For compensation or hire, provided the person is qualified in accordance with this part and with the applicable parts of this chapter that apply to the operation.

(b) Limitations.

(1) A person who applies for a commercial pilot certificate with an airplane category or powered-lift category rating and does not hold an instrument rating in the same category and class will be issued a commercial pilot certificate that contains the limitation, "The carriage of passengers for hire in (airplanes) (powered-lifts) on cross- country flights in excess of 50 nautical miles or at night is prohibited." The limitation may be removed when the person satisfactorily accomplishes the requirements listed in §61.65 of this part for an instrument rating in the same category and class of aircraft listed on the person's commercial pilot certificate.

Source: Summit Aviation's *Computerized Aviation Reference Library*-000301

Commercial Pilot Flight Training Task (Maneuvers and Procedures)
Airplane Single-Engine Checklist

• Preflight Preparation

- ☐ Certificates and Documents
- ☐ Weather Information
- ☐ Cross-Country Flight Planning
- ☐ National Airspace System
- ☐ Performance and Limitations
- ☐ Operation Of (Airplane) Systems
- ☐ Minimum Equipment List *
- ☐ Aeromedical Factors
- ☐ Night Flight, Physiological Aspects Of
- ☐ Night Flight, Lighting and Equipment For

• Preflight Procedures

- ☐ Preflight (Visual) Inspection
- ☐ Cockpit Management
- ☐ Engine Starting
- ☐ Taxiing Procedures
- ☐ Takeoff Check, Before

• Airport Operations

- ☐ Radio Communications and ATC Light Signals
- ☐ Traffic Pattern Operations
- ☐ Airport and Runway Marking and Lighting

• Takeoffs, Landings, and Go-Arounds

- ☐ Normal Takeoff and Climb
- ☐ Crosswind Takeoff and Climb
- ☐ Normal Approach and Landing
- ☐ Crosswind Approach and Landing
- ☐ Soft-Field Takeoff and Climb
- ☐ Soft-Field Approach and Landing
- ☐ Short-Field Takeoff and Climb
- ☐ Short-Field Approach and Landing
- ☐ Go-Around - (Rejected) (Balked) (Aborted) Landing
- ☐ Rejected (Balked) (Aborted) Takeoff *

• Performance Maneuvers

- ☐ Steep Turns
- ☐ Chandelles
- ☐ Lazy Eights

• Ground Reference Maneuver

- ☐ Eights-On-Pylons

• Navigation

- ☐ Pilotage (Ground Features)
- ☐ Dead Reckoning (Computation)
- ☐ Radio Navigation and Radar Services
- ☐ Diversion To Alternate Airport
- ☐ Lost Procedures

• Slow Flight and Stalls

- ☐ Maneuvering During Slow Flight
- ☐ Spin Awareness
- ☐ Full Stalls—Power Off
- ☐ Full Stalls—Power On

• Emergency Operations

- ☐ Emergency Descent
- ☐ Emergency Approach and Landing (Simulated)
- ☐ Systems and Equipment Malfunctions
- ☐ Emergency Equipment and Survival Gear

• High Altitude Operations

- ☐ Supplemental Oxygen (O_2)
- ☐ Pressurization

• Postflight Procedures

- ☐ After Landing Procedures
- ☐ Parking and Securing Airplane

* Not Required By PTS.

The following pilot applicant has received the above indicated aeronautical training, and the following CFI certifies that the pilot applicant was given the above indicated flight training and found competent to perform each pilot operation as a commercial pilot, and has endorsed the pilot's reliable record or logbook accordingly.

CFI - Signature - Date

Pilot Applicant - Signature - Date

DATE

Weather Information

Preflight Preparation

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ Weather Sources .3
- ☐ Obtaining Weather Briefing .3
- ☐ Interpretation and Analysis .6
- ☐ Flight Decisions (Pilot Judgment) .3
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Aeronautical Information Manual (Preflight)
- ☐ Weather Briefing/Flight Planner Form
- ☐ Telephone 800-WX-BRIEF
- ☐ Computer and Modem (DUATS)
- ☐ Weather Information Recording Form
- ☐ 14 Code of Federal Regulations, Part 61, and 91
- ☐ ICAO METAR/TAF Code Format

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits adequate knowledge of the elements related to aviation weather information by obtaining, reading, and analyzing the applicable items such as -

- (a) weather reports and forecasts.
- (b) pilot and radar reports.
- (c) surface analysis charts.
- (d) radar summary charts.
- (e) significant weather prognostics.
- (f) winds and temperatures aloft.
- (g) freezing level charts.
- (h) stability charts.
- (i) severe weather outlook charts.
- (j) tables and conversion graphs.
- (k) SIGMETs and AIRMETs.
- (l) ATIS reports.

☐ 2. Correctly analyzes the assembled weather information pertaining to the proposed route of flight and destination airport, and determines whether an alternate airport is required, and, if required, whether the selected alternate airport meets the regulatory requirement.

ELEMENTS

- ☐ 1. Detailed explanation of FAA objective
- ☐ 2. Sources of weather charts and data
- ☐ 3. Terminal Aerodrome Forecast (TAF)
- ☐ 4. Aviation Routine Weather Report (METAR)
- ☐ 5. METAR/TAF code interpretation(s)
- ☐ 6. Weather charts vs. actual availability
- ☐ 7. Conducive icing conditions probability
- ☐ 8. Alternate airport criteria and selection
- ☐ 9. Temperature/dew point, weather relevance
- ☐ 10. Pilot judgment based on all available data

COMMON ERRORS

- ☐ 1. Failed to request a detailed briefing
- ☐ 2. No NOTAM information obtained
- ☐ 3. Did not get closest VFR weather information
- ☐ 4. Inadequate winds aloft information
- ☐ 5. Inflight weather updating ignored
- ☐ 6. Judgment, go/no-go decision flawed

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria in detail.
- ☐ 2. Introduce and acquaint pilot with all aviation weather information sources, and methods of noting.
- ☐ 3. Furnish pilot with a Weather Briefing/Flight Planner Form, and a proposed route of flight.
- ☐ 4. Demonstrate obtaining and recording a complete preflight weather briefing, which should include: weather synopsis, adverse conditions, current weather, en route forecast, destination TAFs, METARs, FDs, SIGMETs, AIRMETs, PIREPs, and NOTAMs (Notices to Airmen), weather briefer's comments on weather trends and/or RAREPs, including the alternate airports of intended landing.
- ☐ 5. Explain and discuss weather data,and METAR/TAF code format interpretations and analyses.
- ☐ 6. Critique pilot on judgment factors and Pilot-In-Command responsibility.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Become acquainted with all the above sources of weather information available for preflight planning, and study the applicable CFR's.
- ☐ 3. Participate in the examination and review of all data, charts, and reports, etc.
- ☐ 4. Study and comprehend the application and pertinence of each of the objective items above, including currentness and frequency of issuance of all reports and charts.

COMPLETION STANDARDS

- ☐ 1. Exhibited knowledge of aviation weather information by obtaining, reading, analyzing and explaining, with the proper terminology, all of the above items noted in the objective.
- ☐ 2. Pilot has accurately interpreted all weather reports that use the ICAO METAR/TAF code format.
- ☐ 3. Pilot has made a competent go/no-go decision for each and every proposed flight, including alternate requirements, based on the current and forecasted weather reports, type of aircraft and equipment, personal flying ability and experience, and physical limitations, and decided if the flight should be delayed, postponed or canceled.

REFERENCES

AC 61-27C	Instrument Flying Handbook (219)	AC 61-23B	Pilot's Handbook of Aeronautical Knowledge
AC 00-6	Aviation Weather	AC 61-84B	Role of Preflight Preparation
AC 00-45D	Aviation Weather Services	FAA P-8740-30	How To Obtain A Good Weather Briefing
AC 61-21A	Flight Training Handbook	AIM	Aeronautical Information Manual

DATE

Cross–Country Flight Planning

Preflight Preparation

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Legal Requirement, Airplane and Pilot .3
- ☐ Weather Briefing and NOTAMS .5
- ☐ Performance Data, and Weight and Balance .5
- ☐ Selection of IFR Charts and Course .2
- ☐ Navigation Log and Flight Plan .5
- ☐ Pilot Application and Practice 1.0
- ☐ Critique and Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ Aeronautical Information Manual (AIM)
- ☐ Navigation Computer and Plotter
- ☐ Weather Reports, Flight Briefing, NOTAMS
- ☐ Flight Plan Form, Navigation Log
- ☐ CFR Parts 61 and 91

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits adequate knowledge of the elements by presenting and explaining a preplanned cross–country flight, as previously assigned by the examiner (preplanning at examiner's discretion). It should be planned using real time weather and conform to the regulatory requirements of the instrument flight rules within the airspace in which the flight will be conducted.

☐ 2. Exhibits adequate knowledge of the aircraft's performance capabilities by calculating the estimated time en route and total fuel requirement based upon such factors as -

(a) power settings.
(b) operating altitude or flight level.
(c) wind.
(d) fuel reserve requirements.

☐ 3. Selects and correctly interprets the current and applicable en route charts, SID (standard instrument departure), STAR (standard terminal arrival), and standard instrument approach procedure charts.

☐ 4. Obtains and correctly interprets applicable NOTAM information.

☐ 5. Determines the calculated performance is within the aircraft's capability and operating limitations.

☐ 6. Completes and files a flight plan in a manner that accurately reflects the conditions of the proposed flight. (Does not have to be filed with ATC).

ELEMENTS

- ☐ 1. Sources of flight information
- ☐ 2. Providing appropriate equipment
- ☐ 3. Preparation of IFR flight plan
- ☐ 4. Plotting proper route(s) and route(s) segments
- ☐ 5. Preparation of flight navigation log
- ☐ 6. Legal requirements
- ☐ 7. Airplane and pilot fitness
- ☐ 8. Alternate selection, weather minimums

COMMON ERRORS

- ☐ 1. Alternate airport, failure to select
- ☐ 2. Using expired IFR charts
- ☐ 3. Inadequate or faulty course plotting
- ☐ 4. Impractical navigation log
- ☐ 5. Inadequate fuel reserve computation
- ☐ 6. Incomplete weather briefing
- ☐ 7. Failed to obtain current NOTAM data
- ☐ 8. Flight plan, improper filing and/or data

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required performance criteria.
- ☐ 2. Direct pilot to read the section "Flight Planning" in AC 61-27C.
- ☐ 3. Inform pilot that Title 14 of the Code of Federal Regulations (91.103), require each Pilot-In-Command become familiar with **all available** information concerning proposed flight.
- ☐ 4. Demonstrate and simultaneously explain all of the various sources of aeronautical flight planning information, such as listed here in the reference section, or equipment section.
- ☐ 5. Demonstrate how to search for relevant data to be utilized by the pilot to establish the following: IFR weather conditions at, (departure, en route, destination, alternate), NOTAMs, wind, temperature, density altitude, takeoff distance, current chart selection, preferred routes, (destination and alternate), check points, proposed altitude, courses, distances, TAS, GS, ETE, ETA, communications/navigation frequencies, airport facilities data, landing performance, flight and reserve fuel required, and weight and balance within approved limits.
- ☐ 6. Demonstrate how to complete navigation log, flight plan, and the procedures to be used to file with FAA/FSS in a timely manner.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the section "Flight Planning" in AC 61-27C.
- ☐ 3. Practice flight planning skills to achieve competent execution of the objective.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the ability to plan a flight, including navigation log and flight plan, as directed, adhering to all objective criteria.

REFERENCES

AC 61-27C	Instrument Flying Handbook (219)	AC 61-84B	Role of Preflight Preparation
AC 61-21A	Flight Training Handbook (165)	AC 91-23	Pilot's Weight and Balance Handbook
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	A/FD	Airport/Facility Directory

DATE _____

Aircraft Systems Related To IFR Operations

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT _____

SCHEDULE

- ☐ Discuss Lesson Objective .1
- ☐ CFI Explanation and Demonstration .2
- ☐ Pilot Practicing Systems Operations .3
- ☐ Oral Examination of Pilot .3
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ Approved Airplane Flight Manua (AFM)
- ☐ Aircraft Equipment List
- ☐ Aircraft Weight and Balance Data
- ☐ Aircraft Markings and Placards CFR 91.9
- ☐ Static Pressure System Inspection CFR 91.411

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits adequate knowledge of the elements related to applicable aircraft anti-icing/deicing system(s) and their operating methods to include:

(a) Airframe.
(b) Propeller/intake.
(c) Fuel.
(d) Pitot-static.

ELEMENTS

- ☐ 1. Sources of airplane systems information
- ☐ 2. Systems data, charts, and warnings
- ☐ 3. Airplane systems operating criteria
- ☐ 4. Pitot-static inspection requirements
- ☐ 5. Alternate static air system operation
- ☐ 6. Alternate induction air system
- ☐ 7. Windshield defrost system
- ☐ 8. Pitot-static ports, internal and external
- ☐ 9. Carburetor icing, instantaneous response
- ☐ 10. Pitot heat, use only as required
- ☐ 11. Fuel system and vents, total familiarity
- ☐ 12. Manufacturer's recommended checklist

COMMON ERRORS

- ☐ 1. Checklist and/or item(s) bypassed
- ☐ 2. Fuel system, unfamiliar with operation
- ☐ 3. Pitot-static system, unfamiliar with
- ☐ 4. Pitot heat, failed to use in timely manner
- ☐ 5. Static port(s), failed to inspect
- ☐ 6. Carburetor heat, delayed application
- ☐ 7. Icing conditions, failed to recognize
- ☐ 8. V_S increase vs. airfoil ice, ignored change
- ☐ 9. Alternate static source, unable to locate
- ☐ 10. Alternate induction air, unable to locate

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Pitot Static Instruments" in AC 61-27C.
- ☐ 3. Demonstrate and simultaneously explain the FAA Approved Airplane Flight Manual and/or the manufacturer's Pilot's Operating Handbook (POH), and how these manuals should be used to insure that the PIC is familiar with the airplane's applicable anti-icing or de-icing system(s), functions, operation, use, and maintenance directives, as they relate to IFR operations. Insure that the pilot knows the difference between anti-icing and de-icing systems.
- ☐ 4. Instruct pilot on the factors necessary for the formation of structural icing, and explain that the most severe icing is generally encountered between 0° C and -15° C, and when visible liquid moisture is present. However caution pilot that carburetor icing is possible in a much broader range of temperatures and moisture levels. Insure that the pilot will not become confused between the alternate static source, and alternate induction air system.
- ☐ 5. Demonstrate and simultaneously explain the altimeter system and altitude reporting equipment test and inspection requirements, the proper operation of pitot heat, windshield defroster, pneumatic de-icing systems, etc. Advise pilot that the FAA requires the PIC to have thorough operational experience and competence with all systems aboard the airplane.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the section "Pitot Static Instruments" in AC 61-27C.
- ☐ 3. Become familiar with the AFM and/or POH for a specific airplane, and become acquainted with all the above specified IFR systems and components; comprehend the operation and function of each subject item, including evaluating, testing, and limitations.
- ☐ 4. Participate in the examination and review of each system and component.

COMPLETION STANDARDS

- ☐ 1. Pilot has located and explained all anti-icing or de-icing systems, and manufacturer's operating instructions, and has demonstrated a basic understanding of the proper use, maintenance and limitations of all applicable IFR systems listed in the above objective.
- ☐ 2. Pilot has explained the static pressure system inspection requirement noted in CFR 91.411.

REFERENCES

AC 61-27C	Instrument Flying Handbook (27)	AC 61-98	Pilot Transition Courses SEL and MEL
CFR	Part, 61 and Part 91	AC 60-6B	Airplane Flight Manuals (AFM) - Approved Manual Materials, Markings, and Placards
AC 61-21A	Flight Training Handbook (11)		

DATE

Aircraft Flight Instruments and Navigation Equipment

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.1
☐ CFI Demonstration and Explanation	1.0
☐ Pilot Operation, Trial and Practice	2.0
☐ Critique and Discussion	.5
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ Aircraft Equipment List
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Manufacturer's Recommended Checklist
- ☐ Pilot's Operating Handbook (POH)
- ☐ Navigation Equipment Operating Manuals

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits adequate knowledge of the elements related to applicable aircraft flight instrument system(s) and their operating characteristics to include -

- (a) pitot-static.
- (b) altimeter (ALT).
- (c) airspeed indicator (ASI).
- (d) vertical speed indicator (VSI).
- (e) attitude indicator (AI).
- (f) horizontal situation indicator (HSI).
- (g) magnetic compass (MC).
- (h) turn-and-slip indicator (Inclinometer).*
- (i) turn coordinator (TC).
- (j) heading indicator (HI).

☐ 2. Exhibits adequate knowledge of the applicable aircraft navigation system(s) and their operating methods to include -

- (a) VHF omnirange (VOR).
- (b) distance measuring equipment (DME).
- (c) instrument landing system (ILS).
- (d) marker beacon receiver/indicators.
- (e) transponder/altitude encoding.
- (f) automatic direction finder (ADF).
- (g) global positioning system (GPS).*

ELEMENTS

- ☐ 1. Flight instruments, sources of information
- ☐ 2. Utilization AFM and/or POH manuals
- ☐ 3. Pitot-static system and instruments
- ☐ 4. Gyroscopic principles and instruments
- ☐ 5. Control vs. performance instruments
- ☐ 6. Magnetic compass and pre-flight check
- ☐ 7. Navigation system for specific airplane
- ☐ 8. Transponder operations and procedures
- ☐ 9. Primary and supporting instrument jargon
- ☐ 10. Slip and skid, ball indicator

COMMON ERRORS

- ☐ 1. Static port obstructed, not inspected/noticed
- ☐ 2. Knowledge of equipment operation lacking
- ☐ 3. Incorrect altimeter setting utilized
- ☐ 4. AI and HI, failed to set prior to flight

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read "Basic Flight Instruments", "Radio Navigation Systems" in AC 61-27C.
- ☐ 3. Demonstrate and simultaneously explain the AFM and/or POH, and how these manual(s) should be used by the PIC to obtain information regarding the purpose, function, interpretation, operational procedures, and maintenance recommendations for the flight instruments and navigation equipment aboard the specific airplane to be used for flight.
- ☐ 4. Demonstrate and simultaneously explain the pitot-static system and the related flight instruments, such as AS, VSI, and ALT. Additionally review the gyroscopic instruments and the related power source, vacuum (suction), and/or electrical system for the HI, AI, and TC.
- ☐ 5. Advise the pilot that there are a multitude of different types and styles of flight instruments and navigation systems, and that it is the PIC's responsibility to be qualified with their use.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the section "Basic Flight Instruments" and "Radio Navigation Systems" in AC 61-27C.
- ☐ 3. Become familiar with the AFM and/or POH for the specific airplane to be used in flight.
- ☐ 4. Become acquainted with all of the applicable flight instruments and navigation equipment, next study and comprehend the proper operation, interpretation, and function of each item including reliability, limitations and maintenance requirements.
- ☐ 5. Participate in the examination of each flight instrument and navigation system.

COMPLETION STANDARDS

- ☐ 1. Pilot has located all flight instruments and manufacturer's operating instructions.
- ☐ 2. Pilot has demonstrated a basic understanding of airplane's navigation equipment.
- ☐ 3. Pilot has located and explained the proper use, maintenance, and limitations of all applicable airplane flight instruments and navigation systems aboard the airplane to be used for flight.

* Not required by PTS

REFERENCES

AC 61-27C	Instrument Flying Handbook (25, 115)	CFR	91.171, 91.205, 91.411
AC 61-23B	Pilot's Handbook of Aeronautical Knowledge	AC 91-46	Gyroscopic Instruments/Good Operating Practices
AC 61-21A	Flight Training Handbook (26, 49)		

DATE

Instrument Cockpit Check

Preflight Procedures

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.1
☐ CFI Present and Explain Instruments	1.0
☐ CFI Present and Explain Avionics	.5
☐ Pilot Operation, Trial and Practice	1.0
☐ Critique and Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Manufacturer's Recommended Checklist
- ☐ Title 14 of the Code of Federal Regulations (CFR's)
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits adequate knowledge of the elements related to preflight instruments, avionics, and navigation equipment cockpit check by explaining the reasons for the check and how to detect possible defects.

☐ 2. Performs the preflight on instruments, avionics, and navigation equipment cockpit check by following the checklist appropriate to the aircraft flown.

☐ 3. Determines that the aircraft is in condition for safe instrument flight including -

- (a) radio communications equipment.
- (b) radio navigation equipment including the following, as appropriate to the aircraft flown -
  - (1) VOR/VORTAC receiving equipment.
  - (2) ADF receiving equipment.
  - (3) ILS receiving equipment.
- (c) magnetic compass (MC).
- (d) heading indicator (HI).
- (e) attitude indicator (AI).
- (f) altimeter (ALT).
- (g) turn-and-slip indicator/turn coordinator (TC).
- (h) vertical speed indicator (VSI).
- (i) airspeed indicator (ASI).
- (j) clock.
- (k) power source for gyro-instruments.
- (l) pitot heat.

☐ 4. Notes any discrepancies and determines whether the aircraft is safe for instrument flight or requires maintenance.

ELEMENTS

- ☐ 1. Marker beacon indicator check
- ☐ 2. Microphone and headset check
- ☐ 3. Audio control panel operation
- ☐ 4. Vacuum system suction gauge check
- ☐ 5. Electrical system and ammeter check
- ☐ 6. Use of manufacturer's checklist
- ☐ 7. Instrument maintenance records
- ☐ 8. CFR required inspections
- ☐ 9. Log entry of VOR check
- ☐ 10. Clock operating and set to correct time
- ☐ 11. Compass deviation card accuracy
- ☐ 12. Cockpit organization techniques

COMMON ERRORS

- ☐ 1. Static port obstructed, not inspected
- ☐ 2. Incorrect altimeter setting
- ☐ 3. Failure to set attitude indicator
- ☐ 4. Failure to record any and all discrepancies
- ☐ 5. Bypassing checklist and/or item(s)
- ☐ 6. Set wrong heading, frequency or code
- ☐ 7. Failure to secure essential materials
- ☐ 8. Failure to make record of flight progress

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Cockpit Check" lesson in AC 61-27C.
- ☐ 3. Use checklist to determine that all documents and equipment are aboard.
- ☐ 4. Stress to the pilot to refer frequently to the AFM or POH which contain pertinent information regarding equipment, flight instruments, and avionics, etc. Use recommended operating procedures, expected performance, test and utilization guidelines.
- ☐ 5. Explain reason for, and demonstrate the preflight procedures for checking flight instruments, avionics, and navigation equipment to ensure compliance with CFR's and safe operating practices. Make the final determination of airworthy status of the airplane.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, ask and solve questions.
- ☐ 2. Read the section "Cockpit Check" lesson in AC 61-27C.
- ☐ 3. Practice using checklist procedures to determine airworthiness of all cockpit instruments and systems.

COMPLETION STANDARDS

☐ 1. Pilot has explained the reasons for checking flight instruments and NAV/COM avionics and demonstrated the procedures and techniques used to determine suitability for flight, such as: electrical system and ammeter, pitot tube heat, airspeed on zero, heading indicator and turn coordinator move while taxiing turns are made, attitude indicator erect and set, VSI on zero rate, altimeter set and corresponds to manifold pressure prior to starting, verify radio working, magnetic compass free and floating.

REFERENCES

AC 61-27C	Instrument Flying Handbook (247)	POH	Pilot's Operating Handbook
AC 61-21A	Flight Training Handbook (49)	CFR	Part 61, and Part 91

DATE

Air Traffic Control Clearances

Air Traffic Control Clearances and Procedures

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Explanation of Clearances and Elements	.5
☐ CFI Demonstration of ATC Procedures	.5
☐ Pilot Operation, Trial and Practice	1.0
☐ Critique and Preview of Next Lesson	.5

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries
- ☐ Aeronautical Information Manual (AIM)
- ☐ Code of Federal Regulations CFR 91.173

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements related to ATC clearances and pilot/controller responsibilities to include tower en route control and clearance void times.
- ☐ 2. Copies correctly, in a timely manner, the ATC clearance as issued.
- ☐ 3. Determines that it is possible to comply with ATC clearance.
- ☐ 4. Interprets correctly the ATC clearance received and, when necessary, requests clarification, verification, or change.
- ☐ 5. Reads back correctly, in a timely manner, the ATC clearance in the sequence received.
- ☐ 6. Uses standard phraseology when reading back clearance.
- ☐ 7. Sets the appropriate communication and navigation frequencies and transponder codes in compliance with the ATC clearance.

ELEMENTS

- ☐ 1. ATC clearance and separations
- ☐ 2. Clearance limit (EFC Time)
- ☐ 3. Departure procedure and frequency
- ☐ 4. Route of flight
- ☐ 5. Altitude assignment vs. climb gradient
- ☐ 6. Transponder code
- ☐ 7. Holding instructions
- ☐ 8. Clearance void time
- ☐ 9. Pilot's responsibility
- ☐ 10. Clearance shorthand
- ☐ 11. Pilot's clearance readback
- ☐ 12. Tower en route control (TEC)

COMMON ERRORS

- ☐ 1. Set incorrect frequencies or codes
- ☐ 2. Incoherent or illegible clearance request
- ☐ 3. Failure to verify route assignment
- ☐ 4. Accept inappropriate clearance
- ☐ 5. Failed to acknowledge in a timely manner
- ☐ 6. Carelessly pressing microphone button
- ☐ 7. Failed to listen before transmitting
- ☐ 8. Disregarded the use of phonetic alphabet

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Air Traffic Control" in AC 61-27C.
- ☐ 3. Demonstrate and simultaneously explain the elements of ATC clearances requested and received from: Ground Control, Clearance Delivery, Tower Control, Departure Control, and Air Route Traffic Control Center, as well as, the reports from ATIS, and amended clearances. Additionally review and suggest the use of shorthand symbols.
- ☐ 4. Demonstrate and simultaneously explain the correct procedures and techniques to request, copy, review, accept, reject, or correct clearances from all the different ATC control facilities.
- ☐ 5. Advise pilot that CFR 91.3 states: "The Pilot-in-command (PIC) of an aircraft is directly responsible for, and is the final authority as to, the operation of the aircraft." If ATC issues a clearance that in the opinion of the PIC, would place the aircraft in jeopardy, IT IS THE PILOT'S RESPONSIBILITY TO REQUEST AN AMENDED CLEARANCE. If clearance is not understood, PIC must request/demand clarification.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Air Traffic Control" in AC 61-27C.
- ☐ 3. Practice clearance shorthand when requesting and receiving all types of ATC clearances, and employ the proper interpretation, using the correct frequencies and phraseology when reading back clearances in a timely manner, and not accepting any portion of a clearance not understood.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the elements of an ATC clearance and the related controller and pilot responsibilities, and understands that the PIC is responsible for clearance acceptance.
- ☐ 2. Pilot has correctly demonstrated the required techniques and procedures, in requesting, receiving, analyzing, and accepted and/or refused ATC clearances in a timely manner.
- ☐ 3. Pilot has consistently tuned or set the appropriate communication and navigation frequencies and transponder codes in compliance with the ATC clearances.

REFERENCES

AC 61-27C	Instrument Flying Handbook (200)	AFM	FAA-Approved Airplane Flight Manual
AC 61-21A	Flight Training Handbook (78)	CFR	Part 61, and Part 91

DATE

Compliance With Departure, En Route, and Arrival Procedures and Clearances

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Explanation of Charts and Procedures	.5
☐ Demonstration of ATC Compliance	.5
☐ Pilot Operation, Trial and Practice	1.0
☐ Critique and Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries
- ☐ View Limiting Device (IFR Hood)
- ☐ Code of Federal Regulations CFR 91.173

OBJECTIVE

The FAA requires that the pilot applicant:

1. ☐ Exhibits adequate knowledge of the elements related to SIDs, En Route Low Altitude Charts, STARs, and related pilot/controller responsibilities.
2. ☐ Uses the current and appropriate navigation publications for the proposed flight.
3. ☐ Selects and uses the appropriate communications frequencies; selects and identifies the navigation aids associated with the proposed flight.
4. ☐ Performs the appropriate aircraft checklist items relative to the phase of flight.
5. ☐ Establishes two-way communications with the proper controlling agency, using proper phraseology.
6. ☐ Complies, in a timely manner, with all ATC instructions and airspace restrictions.
7. ☐ Exhibits adequate knowledge of two-way radio communications failure procedures.
8. ☐ Intercepts, in a timely manner, all courses, radials, and bearings appropriate to the procedure, route, or clearance.
9. ☐ Maintains the applicable airspeed within ±10 knots; headings within ±10°; altitude within ±100 feet (30 meters); and tracks a course, radial, or bearing.

ELEMENTS

- ☐ 1. Manufacturer's operations checklist
- ☐ 2. Communication procedures and CFR's
- ☐ 3. IFR chart(s), accurate interpretation
- ☐ 4. ATC clearance procedures
- ☐ 5. Precise airplane control
- ☐ 6. Navigation procedures and techniques
- ☐ 7. Avionics appropriately utilized
- ☐ 8. Cockpit organization and management

COMMON ERRORS

- ☐ 1. Incorrect frequency selection
- ☐ 2. Obsolete IFR chart usage
- ☐ 3. Inadequate flight control coordination
- ☐ 4. Mistaken clearance acceptance
- ☐ 5. Navigation/interception timing inadequate
- ☐ 6. Cockpit management inadequate

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "ATC Operations and Procedures" in AC 61-27C.
- ☐ 3. Demonstrate and simultaneously explain, and familiarize the pilot with all current IFR navigational media and charts. Review the legends and appropriate utilization, interpretation, and application of NOS and/or Jeppesen en route low altitude charts, SID's and STAR's.
- ☐ 4. Demonstrate and simultaneously explain proper cockpit procedures in completing the manufacturer's recommended checklist, and the NAV/COM set up, including transponder codes. Additionally, present the proper radio phraseology and procedures in requesting, copying, and complying with ATC clearances. Demonstrate NAV/COM failure procedures as stated in the CFR's, as well as the correct intercept of courses, radials, and bearings promptly. Also the pilot must maintain an adequate level of confidence to ensure the ability to deal with problems as they occur.
- ☐ 5. Conduct a postflight critique, review procedures/techniques, and preview the next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "ATC Operations and Procedures" in AC 61-27C.
- ☐ 3. Practice maneuvering the airplane accurately within the prescribed objective flight criteria, while adhering to ATC "accepted" instructions.
- ☐ 4. Practice phraseology and personal flight shorthand when asking for and receiving ATC clearances, including ATIS, then complying with the same in a timely manner.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated understanding of the elements of departure, en route, and arrival procedures and clearances, through thorough explanation and application.
- ☐ 2. Pilot has competently performed departure, en route, and arrival procedures as instructed by ATC, while adhering to safe operating practices and operating within the objective flight performance criteria effectively, and in a timely routine.

REFERENCES

AC 61-27C	Instrument Flying Handbook (167, 201)	CFR	Title 14 of the Code of Federal Regulations
AC 61-21A	Flight Training Handbook (78)	IFR	En Route, Approach, SID's, and STAR's
AFM	FAA-Approved Airplane Flight Manual	AIM	Aeronautical Information Manual

DATE

Holding (Pattern) Procedures

Air Traffic Control Clearances and Procedures

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Demonstration of Holding Procedures	1.0
☐ Pilot Operation, Trial and Practice	2.7
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard - Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements related to holding procedures.
- ☐ 2. Changes to the holding airspeed appropriate for the altitude or aircraft when 3 minutes or less from, but prior to arriving at, the holding fix.
- ☐ 3. Uses an entry procedure that ensures the aircraft remains within the holding pattern airspace for a standard, non-standard, published, or non-published holding pattern.
- ☐ 4. Recognizes arrival at the holding fix and initiates prompt entry into the holding pattern.
- ☐ 5. Complies with ATC reporting requirements.
- ☐ 6. Uses the proper timing criteria, where applicable, as required by altitude or ATC instructions.
- ☐ 7. Complies with pattern leg lengths, when a DME distance is specified.
- ☐ 8. Uses proper wind correction procedures to maintain the desired pattern and to arrive over the fix as close as possible to a specified time.
- ☐ 9. Maintains the airspeed within ±10 knots; altitude within ±100 feet (30 meters); headings within ±10°; and tracks a specified course, radial, or bearing

ELEMENTS

- ☐ 1. Holding airspace protection
- ☐ 2. Airspeed (propeller) 175 KIAS (Maximum)
- ☐ 3. Standard pattern right turns
- ☐ 4. Timing - 1 minute leg <14000 MSL
- ☐ 5. Entry procedures, three basic
- ☐ 6. ATC holding instructions
- ☐ 7. EFC = expect further clearance
- ☐ 8. EAC = expect approach clearance
- ☐ 9. Holding fix(s) and DME legs
- ☐ 10. Wind correction procedures
- ☐ 11. Six T's checklist, emphasize
  - Time
  - Throttle
  - Turn
  - Track
  - Twist
  - Talk

COMMON ERRORS

- ☐ 1. Violation of airspace boundaries
- ☐ 2. Failure to make timely reports
- ☐ 3. Turn(s) in the wrong direction
- ☐ 4. Inadequate wind drift correction(s)

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain that "holding" is accurately maneuvering an aircraft along a predetermined flight path within prescribed airspace limits, with respect to a geographic fix.
- ☐ 2. Direct pilot to read the section "Holding" in Aeronautical Information Manual.
- ☐ 3. Demonstrate and simultaneously explain copying and reading back the holding clearance, locating and identifying assigned fix on chart. Set up navigation equipment and adjust airspeed, select the correct entry procedure (parallel, teardrop, or direct entry), and execute the hold, upon entry in the hold report to ATC, and confirm EFC or EAC. Using the proper WCA (when outbound triple the inbound WCA to avoid major turns), maintain expected ground track, leg lengths, and assigned altitude, in the standard and nonstandard holding pattern.
- ☐ 4. Conduct a postflight critique, review procedures/techniques, and preview the next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Holding" in Aeronautical Information Manual.
- ☐ 3. Practice and experiment under a wide range of operational conditions. Copy and accept the holding clearance from ATC, locate specified fix on correct IFR chart. Establish appropriate airspeed approximately 3 minutes prior to entering the hold, using the correct procedure to ensure the airplane is within the protected airspace, making timely reports to ATC and applying adequate wind correction(s) that results in an accurately timed correct pattern course.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained all of the elements of the holding procedures, including: the three basic entry procedures, plus timing, reporting, airspeeds, and airspace limits.
- ☐ 2. Pilot has demonstrated the ability to execute parallel, teardrop, and direct entry procedures that ensured the airplane remained within the holding pattern airspace. Used proper wind correction procedures, while adhering to the objective flight performance criteria adequately.

REFERENCES

AC 61-27C	Instrument Flying Handbook (207)	AFM	FAA-Approved Airplane Flight Manual
CFR	Part 61, and Part 91	AIM	Aeronautical Information Manual

DATE

Straight-and-Level Flight

Flight By Reference To Instruments

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Demonstration of straight-and-level Flight .2
- ☐ Pilot Operation, Trial and Practice 1.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements related to attitude instrument flying during straight-and-level flight.
- ☐ 2. Maintains straight-and-level flight in the aircraft configuration specified by the examiner.
- ☐ 3. Maintains the heading within ±10°; altitude within ±100 feet (30 meters); and airspeed within ±10 knots.
- ☐ 4. Uses proper instrument cross-check and interpretation, and applies the appropriate pitch, bank, power, and trim corrections.

ELEMENTS

- ☐ 1. Instrument cross-check technique
- ☐ 2. Instrument interpretation
- ☐ 3. Coordinated use of flight controls
- ☐ 4. Proper division of attention
- ☐ 5. Pilot grip pressure on controls
- ☐ 6. Pitch, power, bank, and trim control

COMMON ERRORS

- ☐ 1. Failure to maintain assigned altitude
- ☐ 2. Failure to maintain constant heading
- ☐ 3. Erratic pitch and bank control
- ☐ 4. Failure to maintain proper trim
- ☐ 5. Failure to interpret all instruments
- ☐ 6. Fixation and/or omission in scanning
- ☐ 7. Freezing, holding controls unaltered
- ☐ 8. Delayed control response
- ☐ 9. Checklist routine and/or item(s) bypassed
- ☐ 10. Uncoordinated use of flight controls

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Straight-and-Level Flight" in AC 61-27C.
- ☐ 3. Pilot applicant should be advised that there are at least two basic methods for teaching attitude instrument flying. First, the primary and supporting instrument method, which divides the instruments into pitch, bank, and power groups, and further classifies them into primary and supporting functions. However the classification varies according to the maneuver and the stage of the procedure. This classification system complicates a simple procedure. This manual encourages the control performance system, also expressed as "attitude + power = performance." **Make configuration sheet.***
- ☐ 4. Demonstrate and simultaneously explain that the instruments are divided into two groups, Control; AI, MP, and/or RPM, and Performance; ASI, ALT, HI, TC, and VSI, and scanning procedures.
- ☐ 5. Demonstrate and simultaneously explain straight-and-level flight. Instruct the pilot applicant to fly by the numbers. Normally a specific pitch and power setting will consistently produce anticipated performance. Determine the performance figures and pitch attitudes for this airplane. Inform pilot that the attitude indicator provides an immediate, direct, and corresponding indication of any change in airplane pitch or bank attitude, and that proper trim application is essential. Stress proper cross-check techniques, and advise pilot to view the attitude indicator when making any control adjustments, required to maintain constant heading, altitude, and airspeed.
- ☐ 6. Conduct a postflight critique, review procedures/techniques, and preview the next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Straight-and-Level Flight" in AC 61-27C.
- ☐ 3. Practice the three fundamental skills while maneuvering the airplane accurately within the prescribed objective flight criteria: (1) instrument cross-check, (2) instrument interpretation, and (3) coordinated airplane control. Experiment with performance figures and pitch attitudes for this airplane.
- ☐ 4. Practice instrument scan and interpretation to perform straight-and-level flight as demonstrated.

COMPLETION STANDARDS

- ☐ 1. Pilot has used proper instrument cross-check and interpretation, and applied the appropriate pitch, bank, power, and trim corrections, and used the attitude + power = performance method.
- ☐ 2. Pilot has exhibited an understanding of attitude instrument flying by explaining the flight instruments, including function and purpose, while performing straight-and-level flight and adhering to the objective flight performance criteria competently, with skilled instrument scanning techniques.

* See Page 3.32

REFERENCES

AC 61-27C	Instrument Flying Handbook (56-60, 253)	AFM	FAA-Approved Airplane Flight Manual
AC 61-21A	Flight Training Handbook (183, 306)	CFR, Part 61	Certification Of Pilots and Flight Instructors

DATE

Change Of Airspeed

Flight By Reference To Instruments

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Demonstration of Airspeed Changes .5
- ☐ Pilot Operation, Trial and Practice 1.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements relating to attitude instrument flying during change of airspeeds in straight-and-level flight and in turns.
- ☐ 2. Establishes a proper power setting when changing airspeed.
- ☐ 3. Maintains the heading within ±10°, angle of bank within ±5° when turning, altitude within ±100 feet (30 meters), and airspeed within ±10 knots.
- ☐ 4. Uses proper instrument cross-check and interpretation, and applies the appropriate pitch, bank, power, and trim corrections.

ELEMENTS

- ☐ 1. Pitch, power, bank, and trim control
- ☐ 2. Instrument cross-check technique
- ☐ 3. Instrument interpretation
- ☐ 4. Coordinated use of flight controls
- ☐ 5. Proper division of attention
- ☐ 6. Pilot grip and/or pressure on controls
- ☐ 7. AI acceleration and deceleration errors
- ☐ 8. Airplane flight configuration data, recording

COMMON ERRORS

- ☐ 1. Inadequate instrument cross-check
- ☐ 2. Misinterpretation of instruments
- ☐ 3. Trim technique ignored or improper
- ☐ 4. Failure to correct small deviations
- ☐ 5. Excessive angle of bank in turns
- ☐ 6. Failure to fly within objective limits

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria. Review the aerodynamic forces on the airplane in straight-and-level flight at a constant airspeed, and the effects of power/airspeed changes, and the resulting pitch action produced by the designed location of CG (weight) versus CP (lift). Review airspeeds/power settings performance charts in AFM.
- ☐ 2. Explain that flying by the numbers is one of the most consistent and efficient methods formulated to control an airplane accurately. Emphasize that the pilot must learn proper pitch attitude, and power settings, to attain the desired airplane performance in the normal flight configurations. Note this data for future reference, see: Power and Performance Data Sheet (for format), on Page 3.32.
- ☐ 3. Demonstrate and explain changing from one airspeed to another, such as normal cruise, approach cruise, and minimum controllable airspeed, in both straight and turning flight (standard rate), and the relationship between increasing/decreasing airspeed and the required pitch attitude change, up or down as viewed on the AI, while maintaining a constant altitude and proper instrument scan. Perform airspeed changes in both a "clean" configuration, then as pilot proficiency increases, with the flaps and landing gear extended, in straight-and-level flight, and in standard rate turns.
- ☐ 4. Demonstrate turning the airplane in level flight that there will be a change in lift vector (load factor) resulting in the need for an increase in AOA (pitch) to hold a specific altitude, and if the same airspeed is required a corresponding increase in power may be needed as opposed to straight flight. Proper control of pitch and bank attitude requires pilot to recognize the effects of gyroscopic precession on the attitude indicator. This precession is most noticeable after a turn or airspeed change.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Determine and note the power settings and pitch attitude for each flight configuration.
- ☐ 3. Practice making airspeed changes in straight and turning (standard rate) level flight.
- ☐ 4. Practice the objective flight operation with all available instruments, then partial panel, without HI, then without HI and AI, while in both clean and landing configuration.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the selection and utilization of the flight instruments for this flight procedure.
- ☐ 2. Pilot used proper instrument cross-check and made appropriate and timely pitch, bank, power, and trim corrections.
- ☐ 3. Pilot has competently performed changes of airspeed in straight and level, and turning (standard rate) and level flight, while adhering to the objective flight performance criteria.

REFERENCES

AC 61-27C	Instrument Flying Handbook (74, 88)	CFR, Part 61	Certification Of Pilots and Flight Instructors
AC 61-21A	Flight Training Handbook (35)	POH	Pilot's Operating Handbook

DATE

Constant Airspeed Climbs

Flight By Reference To Instruments

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Demonstration of Constant Airspeed Climbs .3
- ☐ Pilot Operation, Trial and Practice 1.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard - Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements relating to attitude instrument flying during constant airspeed climbs.
- ☐ 2. Demonstrates climbs at a constant airspeed between specific altitudes in **straight** or **turning** flight as specified by the examiner.
- ☐ 3. Enters constant airspeed climbs from a specified altitude, airspeed, and heading.
- ☐ 4. Establishes the appropriate change of pitch and power to establish the desired climb performance.
- ☐ 5. Maintains the airspeed within ±10 knots, heading within ±10° or, if in a turning maneuver, within ±5° of the specified bank angle.
- ☐ 6. Performs the level-off within ±100 feet (30 meters) of the specified altitude.
- ☐ 7. Uses proper instrument cross-check and interpretation, and applies the appropriate pitch, bank, power and trim corrections.

ELEMENTS

- ☐ 1. Fundamental Instrument skills
  - (a) cross-checking (scanning)
  - (b) Instrument interpretation
  - (c) Airplane attitude control
- ☐ 2. Pitch, power, bank and trim control
- ☐ 3. Anticipation and planning of action
- ☐ 4. Coordinated use of flight controls
- ☐ 5. Determine safe entry altitude
- ☐ 6. Establish a level-off altitude
- ☐ 7. Appropriate division of attention
- ☐ 8. Pilot grip pressure on controls
- ☐ 9. Power management and engine cooling
- ☐ 10. Lead level-off estimated 10% of VSI
- ☐ 11. Airplane performance data utilization

COMMON ERRORS

- ☐ 1. Inadequate cross-check (scanning)
- ☐ 2. Misinterpretation of instruments
- ☐ 3. Poor anticipation and planning of action
- ☐ 4. Attitude indicator not set before takeoff
- ☐ 5. Rudder use and control inadequate
- ☐ 6. Uncoordinated use of flight controls
- ☐ 7. Predetermined flight criteria ignored
- ☐ 8. Fixation on a single instrument
- ☐ 9. Excessive pilot grip pressure on controls
- ☐ 10. Faulty trim application or techniques

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Demonstrate and explain a constant airspeed climb. Initiate a climb from a specified altitude, heading, and cruise IAS. Increase the pitch on the AI the appropriate number of degrees for the assigned airspeed, then as IAS slows to the AFM recommended climb IAS, smoothly add power to the prescribed power setting, trim the airplane to the specified IAS, and maintain this IAS with slight pitch changes. When the pilot knows the specific maneuver desired, in this case a specific IAS, and the attitude and power setting to achieve it, the pilot can control the airplane with great precision, even with the sudden loss of gyro instruments. Perform maneuver with and without AI and HI.
- ☐ 3. Demonstrate and explain a constant airspeed climb while making standard rate turns, both left and right. Explain that the primary difference in the maneuver is a slight pitch increase and rudder application. Without AI and HI the pilot will need to time the turns to roll out on the specified heading.
- ☐ 4. Demonstrate and explain a level-off from a constant airspeed climb. Lead the altitude by approximately 10% of the VSI shown, e.g., for 500 feet per minute, use a 50 foot lead. Start the level-off by simultaneously lowering pitch attitude, eliminate bank, and reduce power to maintain altitude and airspeed. Stress trim as power, pitch, and bank are changed. **Record data, see page 3.32.**

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Straight Climbs and Descents" in AC 61-27C.
- ☐ 3. Practice the skill of establishing the proper climb attitude on the AI, to apply the appropriate control pressure, and to correctly trim the airplane in order to maintain the specified airspeed.

COMPLETION STANDARDS

- ☐ 1. Pilot has performed constant airspeed climbs in straight and turning flight with full and partial panel, while adhering to the objective flight performance criteria competently.

REFERENCES

AC 61-27C	Instrument Flying Handbook (77, 254)	CFR	Part 61, and Part 91
AC 61-21A	Flight Training Handbook (185)	POH	Pilot's Operating Handbook

DATE

Constant Airspeed Descents

Flight By Reference To Instruments

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Demonstration of Constant AS Descents .3
- ☐ Pilot Operation, Trial and Practice 1.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard - Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements relating to attitude instrument flying during constant airspeed descents.
- ☐ 2. Demonstrates descents at a constant airspeed between specific altitudes in straight or turning flight as specified by the examiner.
- ☐ 3. Enters constant airspeed descents from a specified altitude, airspeed, and heading.
- ☐ 4. Establishes the appropriate change of pitch and power to obtain the desired descent performance.
- ☐ 5. Maintains the airspeed within ±10 knots, heading within ±10° or, if in a turning maneuver, within ±5° of the specified bank angle.
- ☐ 6. Performs the level-off within ±100 feet (30 meters) of the specified altitude.
- ☐ 7. Uses proper instrument cross-check and interpretation, and applies the appropriate pitch, bank, power and trim corrections.

ELEMENTS

- ☐ 1. Fundamental attitude instrument skills
  - (a) cross-checking (scanning)
  - (b) Instrument interpretation
  - (c) Airplane attitude control
- ☐ 2. Pitch, power, bank and trim control
- ☐ 3. Anticipation and planning of action
- ☐ 4. Coordinated use of flight controls
- ☐ 5. Predetermined power setting
- ☐ 6. Determine initial altitude
- ☐ 7. Establish a safe level-off altitude
- ☐ 8. Appropriate division of attention
- ☐ 9. Pilot grip pressure on controls
- ☐ 10. Cockpit organization techniques
- ☐ 11. Determine level-off lead altitude
- ☐ 12. Trim control and management
- ☐ 13. Small smooth control adjustments

COMMON ERRORS

- ☐ 1. Overshoot preselected level-off altitude
- ☐ 2. Failure to maintain preselected airspeed
- ☐ 3. Failure to trim airplane to desired airspeed
- 4. Poor anticipation and planning of action
- ☐ 5. Faulty setting of attitude indicator
- ☐ 6. Inadequate flight coordination application
- ☐ 7. Preselected flight criteria ignored
- ☐ 8. Failure to correct small indicated errors

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Demonstrate and simultaneously explain constant airspeed descents. Reduce the IAS to the specified descent airspeed, then make an additional reduction in power to the AFM recommended power setting, and simultaneously lower the pitch to maintain the prescribed IAS, and adjust trim. Perform the procedure in straight and turning (standard rate) flight in both directions. Adjust pitch attitude to maintain IAS.
- ☐ 3. Demonstrate and simultaneously explain level-off from constant airspeed descents. The amount of altitude lead depends upon the rate of descent and control technique. At normal descent airspeed, lead the desired altitude by approximately 50 feet, by simultaneously adjusting the pitch attitude to level flight and adding power to a setting that will hold the IAS constant, and trim airplane.
- ☐ 4. Demonstrate and explain the above maneuver with and without AI and HI. Without AI or HI the pilot will need to time the turns to roll out on the specified heading. Review **attitude + power = performance,** and record the appropriate power and attitude settings, see page 3.32.
- ☐ 5. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Practice descents with all available instruments and without AI or HI, in straight and turning flight.
- ☐ 2. Practice pitch attitudes to determine power setting, attitude, airspeeds, and VSI.
- ☐ 3. Practice level-off technique to determine appropriate lead altitude versus rate of descent.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained all the elements relating to attitude instrument flying during constant airspeed descents, including the determination of the correct power settings and pitch attitude.
- ☐ 2. Pilot has performed constant airspeed descents in straight and turning (standard rate) flight while competently adhering to the objective flight performance criteria.

REFERENCES

AC 61-27C	Instrument Flying Handbook (76-80, 254)	CFR	Part 61, and Part 91
AC 61-21A	Flight Training Handbook (184)	POH	Pilot's Operating Handbook

DATE

Constant Rate Climbs

Flight By Reference To Instruments

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Demonstration of Rate Climbs	.5
☐ Pilot Operation, Trial and Practice	.5
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

1. ☐ Exhibits adequate knowledge of the elements relating to attitude instrument flying during rate climbs.
2. ☐ Demonstrates climbs at a constant rate between specified altitudes in straight or turning flight as directed by the examiner.
3. ☐ Enters rate climbs from a specified altitude, airspeed, and heading.
4. ☐ Establishes the appropriate change of pitch, bank, and power to establish the specified rate of climb.
5. ☐ Maintains the specified rate of climb within ±100 feet per minute, airspeed within ±10 knots, heading within ±10°, or if in a turning maneuver, within ±5° of the specified bank angle.
6. ☐ Performs the level-off within ±100 feet (30 meters) of the specified altitude.
7. ☐ Uses proper instrument cross-check and interpretation, and applies the appropriate pitch, bank, power, and trim corrections.

ELEMENTS

1. ☐ Fundamental attitude instrument skills
   - (a) Cross-checking (scanning)
   - b) Instrument interpretation
   - (c) Airplane attitude control
2. ☐ Calibrate vertical speed indicator (VSI)
3. ☐ Indicated rate versus absolute rate
4. ☐ Anticipation and planning of action
5. ☐ Appropriate division of attention
6. ☐ Trim control and management
7. ☐ Partial panel skills should be emphasized

COMMON ERRORS

1. ☐ Overshoot preselected level-off altitude
2. ☐ Failure to trim airplane to desired airspeed
3. ☐ Partial panel skill or experience inadequate
4. ☐ Inadequate flight coordination application
5. ☐ Preselected flight criteria ignored
6. ☐ Failure to correct small indicated errors

INSTRUCTOR'S ACTIONS

1. ☐ Explain and discuss the lesson elements, objective, and the required knowledge criteria.
2. ☐ Demonstrate and explain constant rate climb, between specified altitudes in straight and turning flight with full and partial panel. Advance the power to the approximate setting that will result in a 500 FPM rate of climb. Pilot should know the airplane's performance data, and understand that attitude + power = performance, see page 3.32. Simultaneously adjust pitch attitude to maintain a constant VSI rate of climb of 500 FPM. Show that any deviation in vertical speed indicates the need for a pitch change, and that the airspeed is controlled by power if available and variable. Pitch and power changes must be coordinated closely: 1.) If the VSI is correct but the airspeed is high, reduce power. 2.) If the VSI is high and the airspeed is low, reduce pitch. 3.) If the VSI is low and the airspeed is low, increase both pitch and power. 4.) If the VSI is high and the airspeed is high, reduce both pitch and power.
3. ☐ Demonstrate and explain a constant rate climb while making standard rate turns, both left and right. Explain that the primary difference in the maneuver is a slight pitch increase and rudder application. Without AI and HI the pilot will need to time the turns to roll out on the correct heading.
4. ☐ Demonstrate and explain a level-off from a constant rate climb. Lead the altitude by approximately 10% of the VSI shown, e.g., for 500 feet per minute, use a 50 foot lead. Start the level-off by simultaneously lowering pitch attitude; eliminate bank, and reduce power to maintain altitude and airspeed. Stress airplane trim as power, pitch, and bank are changed throughout the maneuver.
5. ☐ Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

1. ☐ Practice calibrating the VSI and make adjustments for any error found.
2. ☐ Practice making climbs at a specific VSI, in straight or turning flight, full and partial panel.
3. ☐ Practice level-off technique to determine appropriate lead altitude versus rate of climb.

COMPLETION STANDARDS

1. ☐ Pilot has explained all of the above elements and the need to know the airplane performance data.
2. ☐ Pilot has performed constant rate climbs in straight and turning (standard rate) flight while adhering to the objective flight performance criteria competently with full and partial panel.

REFERENCES

AC 61-27C	Instrument Flying Handbook (77, 258)	CFR	Part 61, and Part 91
AC 61-21A	Flight Training Handbook (185, 307)	POH	Pilot's Operating Handbook

DATE

Constant Rate Descents

Flight By Reference To Instruments

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Demonstration of Rate Descents .5
- ☐ Pilot Operation, Trial and Practice .5
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements relating to attitude instrument flying during rate descents.
- ☐ 2. Demonstrates descents at a constant rate between specified altitudes in straight or turning flight as directed by the examiner.
- ☐ 3. Enters rate descents from a specified altitude, airspeed, and heading.
- ☐ 4. Establishes the appropriate change of pitch, bank, and power to establish the specified rate of descent.
- ☐ 5. Maintains the specified rate of descent within ±100 feet per minute, airspeed within ±10 knots, heading within ±10°, or if in a turning maneuver, within ±5° of the specified bank angle.
- ☐ 6. Performs the level-off within ±100 feet (30 meters) of the specified altitude.
- ☐ 7. Uses proper instrument cross-check and interpretation, and applies the appropriate pitch, bank, power, and trim corrections.

ELEMENTS

- ☐ 1. Fundamental attitude instrument skills
  - (a) Cross-checking (scanning)
  - (b) Instrument interpretation
  - (c) Airplane attitude control
- ☐ 2. Calibrate vertical speed indicator (VSI)
- ☐ 3. Indicated rate versus absolute rate
- ☐ 4. Anticipation and planning of action
- ☐ 5. Appropriate division of attention
- ☐ 6. Trim control and management
- ☐ 7. Partial panel skills should be emphasized

COMMON ERRORS

- ☐ 1. Overshoot preselected level-off altitude
- ☐ 2. Failure to trim airplane to desired airspeed
- ☐ 3. Partial panel skill or experience inadequate
- ☐ 4. Inadequate flight coordination application
- ☐ 5. Preselected flight criteria ignored
- ☐ 6. Failure to correct small indicated errors

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Demonstrate and explain constant rate descent, between specified altitudes in straight and turning flight with full and partial panel. Reduce the power to the approximate setting that will result in a 500 FPM rate of descent. Pilot should know the airplane's performance data, and understand that attitude + power = performance, see page 3.32. Simultaneously adjust pitch attitude to maintain a constant VSI rate of descent of 500 FPM. Show that any deviation in vertical speed indicates the need for a pitch change, and that the airspeed is controlled by power if available and variable. Pitch and power changes must be coordinated closely: 1.) If the VSI is correct but the airspeed is high, reduce power. 2. If the VSI is high and the airspeed is low, reduce pitch. 3. If the VSI is low and the airspeed is low, increase both pitch and power. 4.) If the VSI is high and the airspeed is high, reduce both pitch and power.
- ☐ 3. Demonstrate and explain a constant rate descent while making standard rate turns, both left and right. Explain that the primary difference in the maneuver is a slight pitch increase and rudder application. Without AI and HI the pilot will need to time the turns to roll out on the correct heading.
- ☐ 4. Demonstrate and explain a level-off from a constant rate descent. Lead the altitude by approximately 10% of the VSI shown, e.g., for 500 FPM, use a 50 foot lead. Start the level-off by simultaneously increasing pitch attitude, eliminate bank, and add power to maintain altitude and airspeed. Stress airplane trim as power, pitch, and bank are changed throughout the maneuver.
- ☐ 5. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Practice calibrating the VSI and make adjustments for any error found.
- ☐ 2. Practice making descents at a specific VSI in straight or turning flight, full and partial panel.
- ☐ 3. Practice level-off technique to determine appropriate lead altitude versus rate of descent.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained all of the above elements and the need to know the airplane performance data.
- ☐ 2. Pilot has performed constant rate descents in straight and turning (standard rate) flight while competently adhering to the objective flight performance criteria with full and partial panel.

REFERENCES

AC 61-27C	Instrument Flying Handbook (79, 258)	CFR	Part 61, and Part 91
AC 61-21A	Flight Training Handbook (184, 286)	POH	Pilot's Operating Handbook

DATE

Timed Turns To Magnetic Compass Headings

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Demonstration of Timed Turns	.5
☐ Pilot Operation, Trial and Practice	1.5
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of elements and procedures relating to calibrating the miniature aircraft of the turn coordinator, the operating characteristics and errors of the magnetic compass, and the performance of timed turns to specified compass headings.
- ☐ 2. Establishes indicated standard rate turns, both right and left.
- ☐ 3. Applies the clock correctly to the calibration procedure.
- ☐ 4. Changes the miniature aircraft position, as necessary, to produce a standard rate turn.
- ☐ 5. Makes timed turns to specified compass headings.
- ☐ 6. Maintains the altitude within ±100 feet (30 meters), airspeed within ±10 knots, bank angle ±5° of a standard or half-standard rate turn, and rolls out on specified headings within ±10°.

ELEMENTS

- ☐ 1. Standard rate turn 3° per second
- ☐ 2. Turn coordinator calibration procedures
- ☐ 3. Check compass against runway heading
- ☐ 4. Clock set and functioning
- ☐ 5. Compass and inherent idiosyncrasies
- ☐ 6. Magnetic compass errors (ANDS)
- ☐ 7. Magnetic dip versus latitude position
- ☐ 8. Lag/lead turning error equals latitude
- ☐ 9. Instrument cross-check technique
- ☐ 10. Instrument interpretation
- ☐ 11. Coordinated use of flight controls
- ☐ 12. Proper division of attention
- ☐ 13. Anticipation and planning of action
- ☐ 14. Pitch, power, bank and trim control

COMMON ERRORS

- ☐ 1. Inaccurate time keeping
- ☐ 2. Inconsistent roll-in and roll-out rates
- ☐ 3. Misinterpretation of direction of turns
- ☐ 4. Confused by compass card movement
- ☐ 5. Inadequate bank and altitude control
- ☐ 6. Uncoordinated flight control application

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Explain and demonstrate the calibration of the miniature aircraft of the turn coordinator. With all instruments available, establish a standard rate turn as indicated by the miniature aircraft of the turn coordinator. As the clock second hand reaches a quarter-minute position (12, 3, 6, or 9), check the heading indicator. Check for a turn of 30° each 10 seconds. Make necessary changes in indicated rate on the TC to produce a standard rate turn. Check both directions.
- ☐ 3. Demonstrate and simultaneously explain the turns with all instruments available.
- ☐ 4. Explain and demonstrate timed turns without HI and AI. Enter a standard rate turn, using the miniature aircraft of the turn coordinator as the primary bank instrument while in the turn for 30 seconds, using a constant miniature aircraft position. At the end of 30 seconds, roll out of the turn at the **same rate** you rolled-into the turn. With the wings level and miniature aircraft of the turn coordinator indicating zero rate of turn, the magnetic compass should indicate that a turn of 90° has been completed. The clock has effectively replaced the HI.
- ☐ 5. Explain that for small changes in heading, use a half-standard-rate turn as indicated on the miniature aircraft of the turn coordinator.
- ☐ 6. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Practice calibrating the miniature aircraft of the turn coordinator, and note any discrepancies.
- ☐ 2. Practice making turns to compass headings, without the HI, and without the HI and AI.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained and demonstrated the calibration of the miniature aircraft of the TC accurately in both right and left standard rate turns, while verifying with the magnetic compass.
- ☐ 2. Pilot has explained the operating characteristics and errors of the magnetic compass.
- ☐ 3. Pilot has performed timed turns to specified compass headings using all available instruments and without the use of the AI and HI, while adhering to the objective flight performance criteria accurately.

REFERENCES

AC 61-27C	Instrument Flying Handbook (84, 85, 261)	CFR, Part 61	Certification Of Pilots and Flight Instructors
AC 61-21A	Flight Training Handbook (185)	POH	Pilot's Operating Handbook

DATE

Steep Turns

Flight By Reference To Instruments

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Demonstration of Steep Turns .5
- ☐ Pilot Operation, Trial and Practice 1.5
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard - Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the factors relating to attitude instrument flying during steep turns.
- ☐ 2. Enters a turn using a bank of approximately 45° for an airplane.
- ☐ 3. Maintains the specified angle of bank for either 180° or 360° of turn, both left and right.
- ☐ 4. Maintains altitude within ±100 feet (30 meters), airspeed within ±10 knots, ±5° of specified bank angle, and rolls out within ±10° of the specified heading.
- ☐ 5. Uses proper instrument cross-check and interpretation, and applies the appropriate pitch, bank, power, and trim corrections.

ELEMENTS

- ☐ 1. Fundamental attitude instrument skills
  - (a) Rapidly cross-checking (scanning)
  - (b) Skillful instrument interpretation
  - (c) Proper airplane attitude control
- ☐ 2. Anticipation and planning of action
- ☐ 3. React smoothly, quickly, and confidently
- ☐ 4. Coordinated use of flight controls
- ☐ 5. Proper division of attention
- ☐ 6. Flight control effect analysis
- ☐ 7. Pitch, power, bank and trim control
- ☐ 8. Angle of bank consistently maintained
- ☐ 9. Entry and recovery rate must be consistent

COMMON ERRORS

- ☐ 1. Failure to check for gyro precession of AI
- ☐ 2. Fixation on a single instrument
- ☐ 3. Erratic pitch and bank control
- ☐ 4. Uncoordinated entry and recovery
- ☐ 5. Failure to trim airplane to desired airspeed
- ☐ 6. Tendency for overcontrolling
- ☐ 7. Inadequate cross-check (scanning)
- ☐ 8. Uncoordinated use of flight controls

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Steep Turns" in AC 61-27C.
- ☐ 3. Demonstrate the roll-in and prompt stabilization of a steep turn (45°-50° of bank), this will cause the vertical lift to be diverted to resulting force, therefore there is a need for increased AOA if level flight is to be maintained. Then to counteract the loss of airspeed due to greater AOA, additional power is necessary to maintain the V_A, with the added power, the effects of torque, P-factor, and overbanking tendency (particularly in left turns), will be realized. These forces must be counteracted with slight opposite aileron pressure which will produce adverse yaw, requiring rudder pressure in the direction of the turn. Then roll from one turn directly into a turn in the opposite direction. This maneuver requires rapid instrument analysis, together with constantly varying coordinated control pressures which must be applied faster than in standard rate turns. Stress the value of steep turns to increase pilot's ability to react quickly and smoothly to rapidly changing in airplane attitude.
- ☐ 4. Demonstrate and explain a steep turn, full panel. Initiate a turn of approximately 45°. To maintain altitude, make a pitch change only when the pitch instruments show the need for a change. Add power when the ASI shows a need for it. Cross-check the AI, ALT, and VSI for pitch control. Refer to the attitude indicator when making pitch corrections, taking precession error into consideration. Pilot should use normal and consistent rate of roll-in and roll-out technique.
- ☐ 5. Demonstrate recovery with a smooth normal rate of roll. Since vertical lift increases during rollout, pitch attitude and power should be reduced as required to maintain altitude and airspeed.
- ☐ 6. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Steep Turns" in AC 61-27C.
- ☐ 3. Practice making steep turns in both directions at a specified angle of bank and altitude.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the aerodynamic factors related to attitude instrument flying during steep turns.
- ☐ 2. Pilot has performed steep turns, both left and right, consecutively, using all available instruments, while adhering to the objective flight performance criteria competently.

REFERENCES

AC 61-27C	Instrument Flying Handbook (86, 262)	CFR	Part 61, and Part 91
AC 61-21A	Flight Training Handbook (158)	POH	Pilot's Operating Handbook

DATE

Unusual (Critical) Flight Attitudes, Recovery

Flight By Reference To Instruments

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Demonstration of Unusual Flight	.5
☐ Pilot Operation, Trial and Practice	1.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits adequate knowledge of the elements relating to attitude instrument flying during recovery from unusual flight attitudes (both nose–high and nose–low).

☐ 2. Uses proper instrument cross–check and interpretation, and applies the appropriate pitch, bank, and power corrections in the correct sequence to return the aircraft to a stabilized level flight attitude.

ELEMENTS

- ☐ 1. Fundamental attitude instrument skills
  - (a) Rapidly cross–checking (scanning)
  - (b) Skillful instrument interpretation
  - (c) Proper airplane attitude control
- ☐ 2. Collision avoidance clearing turns
- ☐ 3. Training for the unexpected attitude
- ☐ 4. Attitude realization and orientation
- ☐ 5. Stall recognition and avoidance
- ☐ 6. Recognition of turn direction
- ☐ 7. Recognition of pitch direction
- ☐ 8. Prompt detection and proper correction
- ☐ 9. Apply coordinated aileron and rudder
- ☐ 10. React intelligently not instinctively
- ☐ 11. Symptoms of gyro instrument failure

COMMON ERRORS

- ☐ 1. Disorientation (vertigo)
- ☐ 2. Unintentional stall
- ☐ 3. Misinterpretation of instruments
- ☐ 4. Inappropriate power and/or control use

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Advise pilot that an unusual (critical) attitude is an airplane attitude occurring inadvertently. It may result from one factor or a combination of several factors such as turbulence, distraction of cockpit duties, gyro failure, inattention, spatial disorientation, runaway electric trim, or transition from VMC to IMC, large bodies of water, or dark nights, over sparsely populated areas.
- ☐ 3. Demonstrate and simultaneously explain recognizing an unusual attitude, and that recoveries should be made primarily by reference to ASI, ALT, TC, and VSI due to the possible problems with AI. Remind pilot that the TC provides NO PITCH INFORMATION.
- ☐ 4. Demonstrate and simultaneously explain the nose–low recovery procedures: a) Reduce the power to prevent excessive airspeed and loss of altitude. b) Level the wings by applying coordinated aileron and rudder pressures to level the miniature aircraft of the turn coordinator and center the ball. c) Apply elevator pressure to correct the pitch attitude to level flight, with the aid of the VSI and ALT.
- ☐ 5. Demonstrate and simultaneously explain the nose–high attitude recovery procedures: a) apply power. b) apply forward elevator pressure to lower the nose and prevent a stall. c) correct the bank by applying coordinated aileron and rudder pressure leveling the miniature aircraft of the turn coordinator, and center inclinometer (slip/skid) ball.
- ☐ 6. Explain and demonstrate that the pitch attitude will be approximately level when the ASI and ALT needles stop their movement and VSI reverses its trend. The airplane's bank attitude will be approximately zero when the miniature aircraft of the TC is level. Do not use the AI until you verify that it is in fact reliable. Start a climb or descent back to the original altitude and heading as soon as you attain full control of the airplane and have resumed normal cruise airspeed.

PILOT'S ACTIONS

- ☐ 1. Read the section "Unusual Attitudes and Recoveries" in AC 61-27C.
- ☐ 2. Practice under simulated IMC, recovery from nose–low and nose–high unusual (critical) attitudes with all available instruments, and without the AI and HI.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated and explained the essential awareness of the various elements and circumstances that would permit and/or allow an airplane to develop a hazardous or unusual flight attitude. Recognized the specific attitude by interpreting the ASI, TC, ALT, and VSI, accurately.
- ☐ 2. Pilot has safely and competently demonstrated the ability to recover from a nose high or nose low unusual attitude while adhering to the objective flight performance criteria.

REFERENCES

AC 61-27C	Instrument Flying Handbook (90, 263)	AC 91-61	A Hazard In Aerobatics: Effects of G-Forces
AC 61-21A	Flight Training Handbook (186)	CFR	Part 61, and Part 91

DATE

VOR/VORTAC
Intercepting and Tracking Radials

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Demonstration of VOR Procedures	.5
☐ Pilot Operation, Trial and Practice	2.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements related to VOR/VORTAC radial interception and tracking.
- ☐ 2. Tunes and correctly identifies the VOR/VORTAC facility.
- ☐ 3. Sets, and correctly orients, the radial to be intercepted into the course selector or correctly identifies the radial on the RMI.
- ☐ 4. Intercepts the specified radial at a predetermined angle, inbound or outbound from a VOR/VORTAC facility.
- ☐ 5. Maintains, while intercepting and tracking VOR/VORTAC radials, the airspeed within ±10 knots, altitude within ±100 feet (30 meters), and selected headings within ±5°.
- ☐ 6. Applies proper correction to maintain a radial, allowing no more than a three-quarter-scale deflection of the CDI or within ±10° in the case of an RMI.
- ☐ 7. Determines the aircraft position relative to the VOR/VORTAC facility.
- ☐ 8. Recognizes VOR/VORTAC receiver or facility failure, and, when required, reports the failure to ATC.

ELEMENTS

- ☐ 1. VOR navigation receiver
- ☐ 2. VOR receiver tuning
- ☐ 3. VOR receiver check and log (CFR's)
- ☐ 4. Omni Bearing Selector (OBS)
- ☐ 5. Course Deviation Indicator (CDI)
- ☐ 6. TO/FROM indications
- ☐ 7. VOR signal failure flag
- ☐ 8. Radials and reciprocals
- ☐ 9. CDI angular displacement interpretation
- ☐ 10. VOR orientation and position visualization
- ☐ 11. Reverse sensing
- ☐ 12. Course interception and tracking
- ☐ 13. Station passage
- ☐ 14. Wind drift corrections
- ☐ 15. Eight primary compass headings
- ☐ 16. Correlating airplane's MH and CDI

COMMON ERRORS

- ☐ 1. Aircraft position, precise fix unknown
- ☐ 2. Exceeds objective performance criteria
- ☐ 3. Overshooting course
- ☐ 4. Uncertainty and indecision
- ☐ 5. Poor planning and anticipation
- ☐ 6. Failure to identify VOR facility

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Explain and demonstrate VOR course interception. Turn to a MH to parallel the desired course, in the same direction as the course to be flown. Determine the difference between the radial to be intercepted and the radial on which you are located. Double the difference to determine the interception angle which will be not less than 20° or greater than 90°. Rotate the OBS to the desired radial or inbound course. Turn to the interception heading. Hold this MH constant until the CDI centers, indicating that the airplane is at the course (OBS radial).
- ☐ 3. Explain and demonstrate VOR radial tracking. With the CDI centered, hold the heading corresponding to the selected course. Fly the heading, and observe the CDI for deflection to left or right; the CDI moves toward the crosswind. Turn 20° toward the needle and hold the heading correction until the needle centers. Reduce the drift correction to 10° from the course setting, and note whether this drift-correction angle keeps the CDI centered. Then left or right needle deflections indicate an excessive or insufficient drift-correction angle.
- ☐ 4. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Read the section "Using The Navigation Instruments" in AC 61-27C.
- ☐ 2. Practice tuning and identifying VOR facilities and determining relative position orientation.
- ☐ 3. Practice course interception and tracking by applying the appropriate WCA.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the elements of VOR radial interception and tracking techniques.
- ☐ 2. Pilot has performed an intercept of the assigned radial at predetermined angle, inbound and outbound from a VOR facility, and was able to recognize facility failure, while adhering to the objective flight performance criteria.

REFERENCES

AC 61-27C	Instrument Flying Handbook (138)	AIM	Aeronautical Information Manual
AC 61-21A	Flight Training Handbook (175)	CFR	Part 61, and Part 91

DATE

DME Arcs
Intercepting and Tracking

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Demonstration of DME Procedures	.5
☐ Pilot Operation, Trial and Practice	1.5
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM, and DME
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements related to VOR/DME or VORTAC DME arc interception and tracking.
- ☐ 2. Tunes and correctly identifies the VOR/DME or VORTAC facility.
- ☐ 3. Determines the aircraft position relative to the VOR/DME arc or VORTAC arc facility.
- ☐ 4. Intercepts specified DME arc when proceeding inbound or outbound on a radial.
- ☐ 5. Intercepts a specified radial when proceeding inbound on a DME arc.
- ☐ 6. Intercepts a DME arc and maintains that arc within ±1 nautical mile.
- ☐ 7. Maintains, while intercepting and tracking DME arc, the airspeed within ±10 knots, altitude within ±100 feet (30 meters).
- ☐ 8. Intercepts the desired radial, localizer, or ILS course at the predetermined angle, inbound to the facility.
- ☐ 9. Recognizes VOR/DME or VORTAC receiver or facility failure, and when required, reports the failure to ATC.

ELEMENTS

- ☐ 1. DME airplane equipment operation
- ☐ 2. DME arc flight procedures
- ☐ 3. Intercepting and maintaining DME arc
- ☐ 4. DME arc for any approach segments
- ☐ 5. Determine the direction of turn(s)
- ☐ 6. Accurate lead point for turn(s)
- ☐ 7. DME arc NoPT
- ☐ 8. Turns 30° of bank or less
- ☐ 9. Sequence of tangent headings
- ☐ 10. DME mileage check frequently
- ☐ 11. Changing wind effect and corrections
- ☐ 12. Continuous position orientation
- ☐ 13. DME accuracy 3% or .5 mile
- ☐ 14. Tangent = a straight line from curve

COMMON ERRORS

- ☐ 1. Miscalculation of wind corrections
- ☐ 2. Turning to inappropriate headings
- ☐ 3. Position disorientation
- ☐ 4. Inadequate anticipation and planning

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "DME Arc Procedures" in AC 61-27C.
- ☐ 3. Demonstrate and simultaneously explain the DME arc procedure by using a lead point equal to 1% of ground speed, at 150 KIAS, start turn 1.5 nm from the arc, using 30° of bank or less. While in the turn expand scanning techniques to include monitoring DME readout. Plan turn rollout to be completed on the target distance for the arc. Tracking will be accomplished using the tangent heading method, and making allowances for continually changing wind effect. Start with 20° turns to the inside of the arc. The DME readout will dictate whether to increase or decrease the degree of turns. Orientation can be maintained with the VOR. Center the CDI with a FROM indication, then turn OBS 10° ahead, and continue the tangent turns procedure, and as the CDI centers, repeat the process until interception of the inbound course. In effect fly a partial polygon (multi-sided circle).
- ☐ 4. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "DME Arc Procedures" in AC 61-27C.
- ☐ 3. Practice tuning and identifying VOR/DME facilities, maintaining position orientation, while intercepting arcs and navigating the curved course as published or instructed.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained all of the elements and their relationship to flying the DME arc.
- ☐ 2. Pilot has demonstrated understanding by performing the VOR/DME arc flight procedure, while adhering to the objective flight performance criteria competently.
- ☐ 3. Pilot habitually tuned and identified VOR/DME facilities accurately, while expanding scanning techniques to include DME readout, and maintaining precise flight control coordination.

REFERENCES

AC 61-27C	Instrument Flying Handbook (142)	CFR	Part 61, and Part 91
TERPS	Terminal Instrument Procedures	AIM	Aeronautical Information Manual (1-7, 1-10)

DATE

NDB (ADF)
Intercepting and Tracking Bearings

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Demonstration of NDB Procedures	.5
☐ Pilot Operation, Trial and Practice	2.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard - Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

1. ☐ Exhibits adequate knowledge of the elements of NDB/ADF bearing interception and tracking.
2. ☐ Tunes and correctly identifies the NDB facility.
3. ☐ Sets the volume to a level that allows constant monitoring of the NDB/ADF facility.
4. ☐ Determines accurately the relative bearing of the NDB/ADF facility.
5. ☐ Intercepts a specific bearing to or from the NDB/ADF facility, using appropriate interception procedures.
6. ☐ Maintains, while intercepting and tracking NDB/ADF bearings the airspeed within ±10 knots, altitude within ±100 feet (30 meters), selected heading within ±5°.
7. ☐ Applies proper correction to maintain a bearing within ±10°.
8. ☐ Determines the aircraft position relative to the NDB/ADF facility.
9. ☐ Recognizes ADF receiver or NDB facility failure, and when required, reports the failure to ATC.

ELEMENTS

- ☐ 1. ADF/NDB terminology
- ☐ 2. ADF navigation radio receiver/indicator
- ☐ 3. NDB non-directional radio station
- ☐ 4. Bearing is a relative direction (1° to 360°)
- ☐ 5. Morse code identifier and monitoring
- ☐ 6. Position visualization and orientation
- ☐ 7. ADF indications and interpretations
- ☐ 8. Azimuth card moveable versus stationary
- ☐ 9. Positively identify NDB radio station
- ☐ 10. Wind direction detection and correction
- ☐ 11. Course bracketing procedures
- ☐ 12. ADF equipment familiarization

COMMON ERRORS

- ☐ 1. Misinterpretation of ADF indicator
- ☐ 2. Poor anticipation and planning
- ☐ 3. Inadequate wind drift correction(s)
- ☐ 4. Turn(s) in the wrong direction
- ☐ 5. Failure to tune and identify station
- ☐ 6. Exceeded objective flight criteria
- ☐ 7. Disorientation, especially right from left
- ☐ 8. Inadequate flight control coordination

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Automatic Direction Finder (ADF)" in AC 61-27C.
- ☐ 3. Explain and demonstrate how to find an ADF relative bearing, magnetic bearing, and a true or compass bearing, and how to determine intercept angle for pre-determined bearing.
- ☐ 4. Demonstrate bearing tracking procedures. Turn the airplane until it is pointed directly toward the station with an ADF relative bearing of zero. While holding a constant heading, any deflection of the ADF needle indicates a crosswind. If the needle deflects right, the crosswind is from the right and vice versa. The needle indicates the direction of the turn required to intercept the track. The turn should be made when there is a definite needle deflection of 2° to 5°. The angle of interception will depend on the **rate** at which the airplane drifted from the track, the distance from the station and how quickly you wish to return to track.
- ☐ 5. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Automatic Direction Finder (ADF)" in AC 61-27C.
- ☐ 3. Practice selecting, tuning, and identifying NDB stations, and then monitoring the NDB/ADF facility.
- ☐ 4. Practice position orientation and determining relative bearing of the facility and employing the proper procedures to intercept and track the bearing.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the elements of NDB bearing interception and tracking.
- ☐ 2. Pilot has correctly selected, tuned, and identified NDB stations, and maintained a safe monitoring procedure.
- ☐ 3. Pilot has determined the airplane position and the relative bearing to the facility, used appropriate interception procedures and accurately tracked several NDB bearings.

REFERENCES

AC 61-27C	Instrument Flying Handbook (146)	VEOG	Simple ADF for VFR Navigation # 39
AC 61-21A	Flight Training Handbook (177)	IEOG	Fundamental ADF Procedures # 23
CFR	Part 61, and Part 91	AIM	Aeronautical Information Manual (1-7, 5-44)

DATE

VOR/VORTAC
Instrument Approach Procedures

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Demonstration of VOR Approach	.5
☐ Pilot Operation, Trial and Practice	3.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard - Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits adequate knowledge of the elements related to a VOR/VORTAC instrument approach procedure.

☐ 2. Selects and complies with the appropriate VOR/VORTAC instrument approach procedure to be performed.

☐ 3. Establishes two-way communications with ATC, as appropriate, to the phase of flight or approach segment, and uses proper radio communications phraseology and technique.

☐ 4. Selects, tunes, identifies, and confirms the operational status of navigation equipment to be used for the approach procedure.

☐ 5. Complies with all clearances issued by ATC or the examiner.

☐ 6. Recognizes if heading indicator and/or attitude indicator is inaccurate or inoperative, advises controller, and proceeds with approach.

☐ 7. Advises ATC or examiner anytime the aircraft is unable to comply with a clearance.

☐ 8. Establishes the appropriate aircraft configuration and airspeed considering turbulence and wind shear, and completes the aircraft checklist items appropriate to the phase of flight.

☐ 9. Maintains, prior to beginning the final approach segment, altitude within ±100 feet (30 meters), heading within ±10° and allows less than a full-scale deflection of the CDI or within ±10° in the case of an RMI, and maintains airspeed within ±10 knots.

☐ 10. Applies the necessary adjustments to the published MDA and visibility criteria for the aircraft approach category when required, such as -
- (a) FDC and Class II NOTAMs.
- (b) inoperative aircraft and ground navigation equipment.
- (c) inoperative visual aids associated with the landing environment.
- (d) National Weather Service (NWS) reporting factors and criteria.

☐ 11. Establishes a rate of descent and track that will ensure arrival at the MDA prior to reaching the MAP with the aircraft continuously in a position from which descent to a landing on the intended runway can be made at a normal rate using normal maneuvers.

☐ 12. Allows, while on the final approach segment, no more than a three-quarter-scale deflection of the CDI or within ±10° in case of an RMI, and maintains airspeed within ±10 knots.

☐ 13. Maintains the MDA, when reached, within +100 feet (30 meters), -0 feet to the MAP.

☐ 14. Executes the missed approach procedure when the required visual references for the intended runway are not distinctly visible and identifiable at the MAP.

☐ 15. Executes a normal landing from a straight-in or circling approach when instructed by the examiner.

ELEMENTS

- ☐ 1. Procedure construction, design layout
- ☐ 2. ATC clearances, accept and comply
- ☐ 3. Procedure minimums adherence
- ☐ 4. VOR navigation procedures
- ☐ 5. Airplane airspeed/descent control
- ☐ 6. Instrument interpretation

COMMON ERRORS

- ☐ 1. Chasing the instrument indications
- ☐ 2. Continually overcontrolling airplane
- ☐ 3. Fixation and/or omission in scanning
- ☐ 4. Failure to trim airplane properly
- ☐ 5. Poor attitude and airspeed control
- ☐ 6. Failure to plan/prepare for missed approach

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "VOR Receiver" in AC 61-27C.
- ☐ 3. Demonstrate the VOR/VORTAC approach and landing, while explaining the elements, techniques, and procedures, and complying with all the above described objective criteria.
- ☐ 4. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "VOR Receiver" in AC 61-27C.
- ☐ 3. Complete supervised practice of VOR/VORTAC approach and landing, as demonstrated.

COMPLETION STANDARDS

☐ 1. Pilot has performed the VOR/VORTAC approach and landing, while operating within the prescribed flight parameters effectively, and explained the elements and cautions required.

REFERENCES

AC 61-27C Instrument Flying Handbook (136, 209) | CFR Part 61, and Part 91

DATE

NDB (ADF) Instrument Approach Procedures

Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Demonstration of NDB (ADF) Approach	.5
☐ Pilot Operation, Trial and Practice	3.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements related to an NDB instrument approach procedure.
- ☐ 2. Selects and complies with the appropriate NDB instrument approach procedure to be performed.
- ☐ 3. Establishes two–way communications with ATC, as appropriate to the phase of flight or approach segment, and uses proper radio communication phraseology.
- ☐ 4. Selects, tunes, identifies, confirms, and monitors the operational status of ground and aircraft navigation equipment to be used for the approach procedure.
- ☐ 5. Complies with all clearances issued by ATC or the examiner.
- ☐ 6. Recognizes when heading indicator and/or attitude indicator is inaccurate or inoperative, advises controller, and proceeds with approach.
- ☐ 7. Advises ATC or the examiner anytime the aircraft is unable to comply with a clearance.
- ☐ 8. Establishes the appropriate aircraft configuration and airspeed considering turbulence and wind shear, and completes the aircraft checklist items appropriate to the phase of flight.
- ☐ 9. Maintains, prior to beginning the final approach segment, the altitude within ±100 feet (30 meters), heading and bearing within ±10°, and airspeed within ±10 knots.
- ☐ 10. Applies the necessary adjustments to the published MDA and visibility criteria for the aircraft approach category when required, such as –
  - (a) FDC and Class II NOTAMs.
  - (b) inoperative aircraft and ground navigation equipment.
  - (c) inoperative visual aids associated with the landing environment.
  - (d) National Weather Service (NWS) reporting factors and criteria.
- ☐ 11. Establishes a rate of descent and track that will ensure arrival at the MDA prior to reaching the MAP with the aircraft continuously in a position from which descent to a landing on the intended runway can be made at a normal rate using normal maneuvers.
- ☐ 12. Maintains, while on the final approach segment, a deviation of not more than 10° from the specified bearing, and maintains airspeed within ±10 knots.
- ☐ 13. Maintains the MDA, when reached, within +100 feet (30 meters), –0 feet to the MAP.
- ☐ 14. Executes the missed approach procedure when the required visual references for the intended runway are not distinctly visible and identifiable at the MAP.
- ☐ 15. Executes a normal landing from a straight–in or circling approach when instructed by ATC or the examiner.

ELEMENTS

- ☐ 1. Procedure construction or format
- ☐ 2. ATC clearance compliance
- ☐ 3. Procedure minimums adherence
- ☐ 4. NDB navigation procedures
- ☐ 5. Airplane airspeed/descent control
- ☐ 6. Instrument interpretation

COMMON ERRORS

- ☐ 1. Improper tuning, no station identification
- ☐ 2. Continually homing not tracking
- ☐ 3. Poor orientation and tracking techniques
- ☐ 4. Overcontrolling tracking corrections
- ☐ 5. Monitoring NDB/ADF signal, inadequate
- ☐ 6. Inappropriate interception angles
- ☐ 7. Undershooting and overshooting course
- ☐ 8. Faulty HI and ADF interpretations

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Automatic Direction Finder (ADF)" in AC 61-27C.
- ☐ 3. Demonstrate the NDB approach and landing, while explaining the elements, techniques, and procedures, and complying with all the objective standards.
- ☐ 4. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Automatic Direction Finder (ADF)" in AC 61-27C.
- ☐ 3. Complete supervised practice of NDB approach and landing, as demonstrated.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated the skill and understanding of the objective by performing the NDB approach and landing, while operating within the prescribed flight parameters effectively, and explained the elements and cautions required.

REFERENCES

AC 61-27C Instrument Flying Handbook (136, 209) | CFR Part 61, and Part 91

DATE

ILS
Instrument Approach Procedures
Practical Test Standards · Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Demonstration of ILS Approach	.5
☐ Pilot Operation, Trial and Practice	3.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits adequate knowledge of the elements of an ILS instrument approach procedure.

☐ 2. Selects and complies with the appropriate ILS instrument approach procedure to be performed.

☐ 3. Establishes two-way communications with ATC, as appropriate to the phase of flight or approach segment, and uses proper radio communications phraseology and technique.

☐ 4. Selects, tunes, identifies, and confirms the operational status of ground and aircraft navigation equipment to be used for the approach procedure.

☐ 5. Complies with all clearances issued by ATC or the examiner.

☐ 6. Advises ATC or examiner anytime the aircraft is unable to comply with a clearance.

☐ 7. Establishes the appropriate aircraft configuration and airspeed, considering turbulence and wind shear, and completes the aircraft checklist items appropriate to the phase of flight.

☐ 8. Maintains, prior to beginning the final approach segment, specified altitude within ±100 feet (30 meters), heading or course within ±10°, and airspeed within ±10 knots.

☐ 9. Applies the necessary adjustments to the published DH and visibility criteria for the aircraft approach category when required, such as –
- (a) FDC and Class II NOTAMs.
- (b) inoperative aircraft and ground navigation equipment.
- (c) inoperative visual aids associated with the landing environment.
- (d) National Weather Service (NWS) reporting factors and criteria.

☐ 10. Establishes an initial rate of descent at the point where the electronic glide slope is intercepted, which approximates that required for the aircraft to follow the glide slope.

☐ 11. Allows, while on the final approach segment, no more than three-quarter-scale deflection of either the localizer or glide slope indications, and maintains the specified airspeed within ±10 knots.

☐ 12. Avoids descent below the DH before initiating a missed approach procedure or transitioning to a normal landing approach.

☐ 13. Initiates immediately the missed approach procedure when, at the DH, the required visual references for the intended runway are not distinctly visible and identifiable.

☐ 14. Transitions to a normal landing approach when the aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers.

ELEMENTS

- ☐ 1. Approach chart interpretation
- ☐ 2. ATC clearance compliance
- ☐ 3. Procedure minimums compliance
- ☐ 4. ILS approach procedures
- ☐ 5. Airplane airspeed/descent control
- ☐ 6. Instrument interpretation

COMMON ERRORS

- ☐ 1. Radio receiver accuracy, failure to check
- ☐ 2. Turned incorrectly on the procedure turn
- ☐ 3. Fixation on a single instrument, LOC or GS
- ☐ 4. Failure to trim airplane properly
- ☐ 5. Poor attitude and airspeed control
- ☐ 6. Uncoordinated use of flight controls

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge, and skill criteria.
- ☐ 2. Direct pilot to read the section "Instrument Landing System" in AC 61-27C.
- ☐ 3. Demonstrate the ILS approach and landing, while explaining the elements, techniques, and procedures, and complying with all the objective standards, and the utilization of appropriate checklist.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Instrument Landing System" in AC 61-27C.
- ☐ 3. Complete supervised practice of instrument ILS approach and landing, as demonstrated.

COMPLETION STANDARDS

☐ 1. Pilot has demonstrated the skill and understanding of the objective by performing the ILS approach and landing, while operating within the prescribed flight parameters effectively, and explained the elements and cautions required, for a safe execution of the procedure.

REFERENCES

AC 61-27C	Instrument Flying Handbook (126)	CFR	Part 61, and Part 91
AC 61-21A	Flight Training Handbook (183)	AIM	Aeronautical Information Manual (1-10)

DATE

Missed Approach Procedures

Instrument Approach Procedures

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Demonstration of Missed Approach .5
- ☐ Pilot Operation, Trial and Practice 3.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements related to missed approach procedures associated with standard instrument approaches.
- ☐ 2. Initiates the missed approach promptly by applying power, establishing a climb attitude, and reducing drag in accordance with the aircraft manufacturer's recommendations.
- ☐ 3. Reports to ATC beginning the missed approach procedure.
- ☐ 4. Complies with the published or alternate missed approach procedure.
- ☐ 5. Advises ATC or examiner anytime the aircraft is unable to comply with a clearance, restriction, or climb gradient.
- ☐ 6. Follows the recommended checklist items appropriate to the go-around procedure.
- ☐ 7. Requests, if appropriate, ATC clearance to the alternate airport, clearance limit, or as directed by the examiner.
- ☐ 8. Maintains the recommended airspeed within ±10 knots; heading, course, or bearing within ±10°; and altitudes(s) within ±100 feet (30 meters) during the missed approach procedure.

ELEMENTS

- ☐ 1. All approaches have a missed procedure
- ☐ 2. Circling to land turn, check turn direction
- ☐ 3. Protected area
- ☐ 4. Flight visibility less than prescribed
- ☐ 5. Execute at missed approach point (MAP)
- ☐ 6. Execute at decision height (DH)
- ☐ 7. Report execution of missed approach
- ☐ 8. Visual contact with runway lost, execute
- ☐ 9. Missed approach published on chart
- ☐ 10. Pilot should memorize procedure
- ☐ 11. Cockpit management and organization
- ☐ 12. Landing minimums (CFR 91.175)

COMMON ERRORS

- ☐ 1. Disorganized cockpit, poor management
- ☐ 2. Failure to establish correct attitude
- ☐ 3. Bypassing checklist and/or item(s)
- ☐ 4. Missed approach procedure report, ignored
- ☐ 5. Procedure not executed in a timely manner
- ☐ 6. Fatigue, uncertainty, and indecision
- ☐ 7. Failure to trim airplane to desired airspeed
- ☐ 8. Poor power management

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Missed Approaches" in AC 61-27C.
- ☐ 3. Explain that the pilot should be mentally prepared to immediately abandon the approach and execute the missed approach applying the data mentally retained after examining the current procedure, while changing the attitude and configuration of the airplane, and making the required report to ATC bearing in mind the answer to the inevitable question from the controller, "What are your intentions?" This is an intensely mentally taxing, and physically demanding activity required of the pilot at a stage of flight when the pilot is most susceptible to the real causes of fatigue. When the pilot is tired and tense, flight performance will rapidly diminish below par, by the square root of the fatigue factor. This procedure requires trained focus and attentive skilled airplane control.
- ☐ 4. Explain and demonstrate several different missed approach procedures and techniques.
- ☐ 5. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Missed Approaches" in AC 61-27C; study several missed approach procedures.
- ☐ 3. Practice different missed approach procedures employing all of the above elements, including reports to ATC and respond promptly, accurately, and decisively.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained how to find the specific action to be taken for any particular missed approach by examining the approach chart, and explained the critical significance of MDA and DH.
- ☐ 2. Pilot has performed several missed approaches and demonstrated adequate cockpit management, and skilled airplane control, while adhering to the objective flight criteria.

REFERENCES

AC 61-27C	Instrument Flying Handbook (216)	CFR	Part 61, and Part 91
AC 61-21A	Flight Training Handbook	AIM	Aeronautical Information Manual (5-56)

DATE

Circling Approach Procedure

Instrument Approach Procedures

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Demonstration of Circling Approach	.5
☐ Pilot Operation, Trial and Practice	2.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA–Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip / Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements related to a circling approach procedure.
- ☐ 2. Selects and complies with the appropriate circling approach procedure considering turbulence and wind shear and considering the maneuvering capabilities of the aircraft.
- ☐ 3. Confirms the direction of traffic and adheres to all restrictions and instructions issued by ATC and the examiner.
- ☐ 4. Does not exceed the visibility criteria or descend below the appropriate circling altitude until in a position from which a descent to a normal landing can be made.

ELEMENTS

- ☐ 1. This is not a good night procedure
- ☐ 2. Difficult and strenuous procedure
- ☐ 3. Use extreme caution and vigilance
- ☐ 4. High cockpit management workload
- ☐ 5. Challenging transition from IFR to VFR
- ☐ 6. Obstruction clearance criteria
- ☐ 7. Minimum obstruction clearance 300'
- ☐ 8. Turns at standard rate or less
- ☐ 9. Pilot should set realistic minimums
- ☐ 10. Airplane categories versus airspeeds
- ☐ 11. Detailed examination of approach chart
- ☐ 12. Uncontrolled airport report on CTAF
- ☐ 13. Landing minimums (CFR 91.175)
- ☐ 14. Establish normal descent to landing

COMMON ERRORS

- ☐ 1. Eagerness to land
- ☐ 2. Exceeds prudent angle of bank
- ☐ 3. Faulty pilot judgment
- ☐ 4. Continued circling into IMC, failed to abort
- ☐ 5. Descent below MDA
- ☐ 6. Transgressed obstruction clearance area
- ☐ 7. Inappropriate altimeter setting for MDA
- ☐ 8. Excessive airspeed
- ☐ 9. Erratic control applications
- ☐ 10. Ignored checklist procedures or item(s)

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read the section "Circling Approaches" in AC 61-27C.
- ☐ 3. Explain to the pilot that whenever the optimum rate of descent (500' per mile) is exceeded or course alignment with the runway exceeds 30°, circle-to-land minimums must be used. A circle-to-land procedure provides guidance to the obstacle clearance area, not the runway.
- ☐ 4. Explain and demonstrate that each landing situation is unique because of the many variables of ceiling, visibility, wind direction and velocity, obstruction clearance, and the final approach to the field. Each case will require a different technique and/or method. Advise that this is more often than not an exercise in pilot judgment. Once the pilot is at the airport area, it puts the airplane in the worst possible situation. The airplane is at a low altitude, usually in landing configuration, and is maneuvering at very low KIAS. The pilot must determine the active runway, maneuver to the approach position, and then land the airplane, in minimum visibility conditions. The missed approach point is designed to occur at the runway threshold or the airport boundary, depending upon the approach, but on a circling maneuver it can occur anywhere after leaving the approach course. Lose site of runway, execute an immediate missed approach without any hesitation. Demonstrate several circle-to-land methods.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "Circling Approaches" in AC 61-27C.
- ☐ 3. Practice making the circle-to-land approach, using the manufacturer's recommendations.

COMPLETION STANDARDS

- ☐ 1. Pilot has explained the elements and more importantly the analysis of variables that affect the decision process that leads to safe and practical pilot judgment.
- ☐ 2. Pilot has performed several different circle-to-land procedures with skill and safe piloting techniques, while adhering to the objective published flight performance criteria.

REFERENCES

AC 61-27C	Instrument Flying Handbook (215)	CFR	Part 61, and Part 91
AC 61-21A	Flight Training Handbook	AIM	Aeronautical Information Manual

DATE _____

Landing From A Straight-In Approach Procedure

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT _____

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Demonstration of Straight-In Landing .5
- ☐ Pilot Operation, Trial and Practice 1.5
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard - Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements related to the pilot's responsibilities, and the environmental, operational, and meteorological factors which affect a landing from a straight-in approach.
- ☐ 2. Transitions at the DH, MDA, or VDP to a visual flight condition, allowing for safe visual maneuvering and a normal landing.
- ☐ 3. Adheres to all ATC (or examiner) advisories such as: NOTAMs, wind shear, wake turbulence, runway surface, braking conditions, and other operational considerations.
- ☐ 4. Completes appropriate checklist items for the pre-landing and landing phase.
- ☐ 5. Maintains positive aircraft control throughout the complete landing maneuver.

ELEMENTS

- ☐ 1. Uncontrolled airport report on CTAF
- ☐ 2. Altimeter setting - local or remote
- ☐ 3. Anticipation and planning of action
- ☐ 4. Stress use of checklist and procedures
- ☐ 5. High cockpit management workload
- ☐ 6. Challenging transition from IFR to visual
- ☐ 7. Visual adaptation to darkness
- ☐ 8. Windshield effects of rain, snow, or ice
- ☐ 9. Airport, runway lighting, and VASI
- ☐ 10. Wind check and appropriate action
- ☐ 11. Configuration and speed set per AFM
- ☐ 12. Minimum obstruction clearance 250'
- ☐ 13. Fatigue and effect on pilot judgment
- ☐ 14. Pilot should set realistic minimums
- ☐ 15. Careful study of airport plan view on chart
- ☐ 16. Landing minimums (CFR 91.175)
- ☐ 17. Avoid tendency to make fast approach
- ☐ 18. Establish normal descent to landing

COMMON ERRORS

- ☐ 1. Touchdown with excessive airspeed
- ☐ 2. Inclination to rush the landing procedure
- ☐ 3. Hazardous attitude and/or power change
- ☐ 4. Overshoot or undershoot runway
- ☐ 5. Did not consider runway slope factor
- ☐ 6. Landing sabotaged by severe crosswind
- ☐ 7. Weather conditions exceeded pilot ability
- ☐ 8. Exceeded prudent angle of bank
- ☐ 9. Faulty pilot judgment
- ☐ 10. Inaccurate weather information
- ☐ 11. Unauthorized descent below MDA
- ☐ 12. Inappropriate altimeter setting for MDA
- ☐ 13. Failure to execute a missed approach
- ☐ 14. Ignored checklist procedures or item(s)

INSTRUCTOR'S ACTIONS

- ☐ 1. Advise pilot that when the final approach course is within 30° of the runway alignment and a normal descent can be made from the IFR altitude, then a straight-in approach is published and authorized.
- ☐ 2. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 3. Assign and direct pilot to study a select group of approach procedure charts.
- ☐ 4. Demonstrate and simultaneously explain making reports to ATC, establishing manufacturer's recommended configuration and airspeeds while maneuvering the airplane within the prescribed geographical and altitudinal limits of a straight-in approach. Using the normal landing techniques, including crosswind corrections, perform a safe touchdown and landing.
- ☐ 5. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read and study the assigned selected group of approach procedure charts.
- ☐ 3. Practice making straight-in patterns to achieve runway alignment while controlling the airplane within safe geographical limits, and adhering to manufacturer's recommendations.

COMPLETION STANDARDS

- ☐ 1. Pilot has accurately explained all of the above elements for a normal landing approach (final approach course and runway alignment are 30° or less), procedure.
- ☐ 2. Pilot has performed an approach to a normal landing from a straight-in approach while maintaining positive airplane control throughout the complete landing maneuver proficiently.

REFERENCES

AC 61-27C	Instrument Flying Handbook (12, 189, 217)	CFR	Part 61, and Part 91
AC 61-21A	Flight Training Handbook	AIM	Aeronautical Information Manual

DATE

Landing From A Circling Approach (Maneuvering) Procedure

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Demonstration of Circling Landing	.5
☐ Pilot Operation, Trial and Practice	1.5
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

- ☐ 1. Exhibits adequate knowledge of the elements related to the pilot's responsibilities, and the environmental, operational, and meteorological factors which affect a landing from a circling approach.
- ☐ 2. Transitions at the DH, MDA, or VDP to a visual flight condition, allowing for safe visual maneuvering and a normal landing.
- ☐ 3. Adheres to all ATC (or examiner) advisories such as: NOTAMs, wind shear, wake turbulence, runway surface, braking conditions, and other operational considerations.
- ☐ 4. Completes appropriate checklist items for the pre-landing and landing phase.
- ☐ 5. Maintains positive aircraft control throughout the complete landing maneuver.

ELEMENTS

- ☐ 1. Uncontrolled airport report on CTAF
- ☐ 2. Altimeter setting - local or remote
- ☐ 3. This is not a good night procedure
- ☐ 4. Difficult and strenuous procedure
- ☐ 5. Anticipation and planning of action
- ☐ 6. Use extreme caution and vigilance
- ☐ 7. Emphasize use of checklist procedures
- ☐ 8. High cockpit management workload
- ☐ 9. Challenging transition from IFR to visual
- ☐ 10. Visual adaptation to darkness
- ☐ 11. Windshield effects of rain, snow, or ice
- ☐ 12. Airport, runway lighting, and VASI
- ☐ 13. Wind check and appropriate action
- ☐ 14. Configuration and speed set per AFM
- ☐ 15. Obstruction clearance criteria
- ☐ 16. Minimum obstruction clearance 300'
- ☐ 17. Fatigue and effect on pilot judgment
- ☐ 18. Turns at standard rate or less
- ☐ 19. Pilot should set realistic minimums
- ☐ 20. Airplane categories versus airspeeds
- ☐ 21. Careful study of airport plan view on chart
- ☐ 22. Required to reverse course to land
- ☐ 23. Landing minimums (CFR 91.175)
- ☐ 24. Establish normal descent to landing

COMMON ERRORS

- ☐ 1. Touchdown with excessive airspeed
- ☐ 2. Inclination to rush the landing procedure
- ☐ 3. Hazardous attitude and/or power change
- ☐ 4. Overshoot or undershoot runway
- ☐ 5. Did not consider runway slope factor
- ☐ 6. Landing sabotaged by crosswind
- ☐ 7. Weather conditions exceeded pilot ability
- ☐ 8. Exceeded prudent angle of bank
- ☐ 9. Faulty pilot judgment
- ☐ 10. Inaccurate weather information
- ☐ 11. Unauthorized descent below MDA
- ☐ 12. Inappropriate altimeter setting for MDA
- ☐ 13. Failure to execute a missed approach
- ☐ 14. Ignored checklist procedures or item(s)

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Assign and direct pilot to study a select group of approach procedure charts.
- ☐ 3. Demonstrate and simultaneously explain making reports to ATC, establishing manufacturer's recommended configuration and airspeeds while maneuvering the airplane within the prescribed geographical and altitudinal limits of a circling approach. Using the normal landing techniques, including crosswind corrections, perform a safe touchdown and landing.
- ☐ 4. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read and study the assigned selected group of approach procedure charts.
- ☐ 3. Practice making circling patterns to achieve runway alignment while controlling the airplane within safe geographical limits, and adhering to manufacturer's recommendations.

COMPLETION STANDARDS

- ☐ 1. Pilot has accurately explained all of the above elements for a circling approach and landing from a circling approach procedure, (final approach and runway alignment are greater than 30°).
- ☐ 2. Pilot has competently performed an approach to a normal landing from a circling approach while maintaining positive airplane control throughout the complete landing maneuver.

REFERENCES

AC 61-27C	Instrument Flying Handbook (12, 95, 189, 217)	CFR	Part 61, and Part 91
AC 61-21A	Flight Training Handbook	AIM	Aeronautical Information Manual

DATE

Loss Of Communications

Emergency Operations

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Demonstration of Emergency Communications .5
- ☐ Pilot Operation, Trial and Practice of Rules 1.0
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant exhibits adequate knowledge of the elements related to applicable lost of communications procedures to include:

- ☐ 1. Recognizing loss of communication.
- ☐ 2. Continuing to destination according to the flight plan.
- ☐ 3. When to deviate from the flight plan.
- ☐ 4. Timing for beginning an approach at destination.

ELEMENTS

- ☐ 1. Route of flight expected to navigate rule
- ☐ 2. Altitude rule expected to follow
- ☐ 3. Approach expected execution rule
- ☐ 4. Proceed "As Filed" vs. amended clearance
- ☐ 5. Clearance limit, time of departure rule
- ☐ 6. Expect Further Clearance (EFC) rule
- ☐ 7. Expect Approach Clearance (EAC) rule
- ☐ 8. Emergency transponder code 7600
- ☐ 9. Judgment, pilot making responsible decisions
- ☐ 10. Monitor navigational radio aids
- ☐ 11. Long periods of communication silence
- ☐ 12. Holding pattern departure rule
- ☐ 13. PIC responsibility and authority
- ☐ 14. Reestablishing radio contact attempts

COMMON ERRORS

- ☐ 1. Audio control panel functions are unfamiliar
- ☐ 2. Radio equipment confusing to pilot
- ☐ 3. Radio on, but volume off or inaudible
- ☐ 4. Frequency selection was incorrect
- ☐ 5. Volume control was turned off inadvertently
- ☐ 6. Microphone inoperable
- ☐ 7. Antennas, failed to inspect adequately
- ☐ 8. Squelch control set to off unintentionally
- ☐ 9. En Route charts expired, frequencies wrong
- ☐ 10. Transmitter inoperable

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read and study the material stated in the Pilot's Actions section.
- ☐ 3. Demonstrate and simultaneously explain the CFR rules, and AIM procedures that the pilot must adhere to during two-way radio failure in IMC. **Altitude** requirements: the pilot will fly at the highest of the following altitudes for the route segment being flown: 1.) the altitude assigned in the last ATC clearance received; 2.) the MEA; or 3.) the altitude ATC has advised may be expected in a further clearance (EFC). **Route** requirements: 1.) the last ATC clearance received; or 2.) if being radar vectored, by the fix, route, or airway specified in the vector clearance; or 3.) the EFC routing. In the absence of applicable rules above, then proceed by the fight planned route as cleared. **Holding** fix departure (instruction received): 1.) at EFC (if received); or 2.) to make EAC (if received). **Approach** Requirements: Initiate descent for approach when reaching approach fix, 1.) at EAC time; or 2.) at ETA time; or 3.) immediately (no EAC and ETA has elapsed).
- ☐ 4. Explain and demonstrate several examples of the above rules in all stages and segments of flight.
- ☐ 5. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read the section "ATC Clearances/Separations" and "Two-Way Radio Communication Failure" in the AIM. Read and comprehend CFR's Part 91.3(b), and 91.185
- ☐ 3. Practice employing the specific rules of expected actions of the PIC for the various stages and segments of flight regarding route, altitude, holding patterns, and approach descent and initiation.
- ☐ 4. Practice with CFI simulated two-way radio failure situations not covered in the regulations. Pilot must develop competent judgment in whatever actions or decisions elected to be utilized.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated a consistent habit of radio communication familiarity and vigilance.
- ☐ 2. Pilot has explained the expected action of the PIC in the event of a two-way radio failure, which in part is determined by the meteorological conditions at the time, IMC versus VMC.
- ☐ 3. Pilot has explained in detail that if the radio failure occurs in VMC, it would be appropriate to deviate from the flight plan and land as soon as practicable, and if in IMC, to follow the procedures stated in the AIM and the rules in the CFR's
- ☐ 4. Pilot has explained a precise understanding as to when to start an approach at the destination.

REFERENCES

AIM Aeronautical Information Manual | CFR Part 61, and Part 91

DATE

Loss Of Gyro Attitude and/or Heading Indicators

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.2
☐ Demonstration of no-gyro Procedures	.5
☐ Pilot Operation, Trial and Practice	1.5
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

The FAA requires that the pilot applicant:

☐ 1. Exhibits adequate knowledge of the elements relating to recognizing if attitude indicator and/or heading indicator is inaccurate or inoperative, and advises ATC or the examiner.

☐ 2. Advises ATC or examiner anytime the aircraft is unable to comply with a clearance.

☐ 3. Completes instrument approach if applicable.

ELEMENTS

- ☐ 1. Vacuum (suction) system components
- ☐ 2. Inspection and maintenance of gyro system
- ☐ 3. Required suction in inches of mercury (Hg)
- ☐ 4. Sources of power for gyro operation
- ☐ 5. Symptoms of gyro instrument failure
- ☐ 6. Partial panel flight technique and procedure
- ☐ 7. Electric power indicators or warning lights
- ☐ 8. Periodical correction for drift precession
- ☐ 9. Erecting and caging mechanisms for AI
- ☐ 10. Gyroscopic instrument familiarity

COMMON ERRORS

- ☐ 1. Preflight procedures or techniques incomplete
- ☐ 2. Cross-checking (scanning) inadequate
- ☐ 3. Gyro precession not recurrently corrected
- ☐ 4. Gyro failure preparedness undependable
- ☐ 5. Malfunctions not reported in a timely manner
- ☐ 6. Gyro inaccuracies not discovered or verified
- ☐ 7. Disorientation, vertigo and dizziness
- ☐ 8. AI and HI, failed to set prior to flight

INSTRUCTOR'S ACTIONS

☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.

☐ 2. Direct pilot to read the section "Gyroscopic Instruments",and "No-Gyro Approach" in AC 61-27C.

☐ 3. Demonstrate and simultaneously explain gyroscopic principles, source of power (vacuum or electric), the proper function and visual presentations of all gyro instruments. The HI must be set to an accurate magnetic reference, not runway numbers that vary as much as 5° from precise magnetic headings and reset regularly. Impending failure of a gyro may announce itself in several ways, such as: a HI that shows excessive drift, more than ±3° per 15 minutes, or the HI is off ±2° after a 360° turn, or the TC has a sluggish response, or AI is slow to erect and/or shows deviation from level flight when the aircraft is, in fact, straight and level. After engine shutdown listen to gyros for noise that may indicate wear or damage to bearings. Vacuum gauge, usually 4.0 inches of Hg, and electric meters or warning lights should be monitored periodically. Pursuant to CFR's, when a failure occurs ATC must be notified. It is imperative for pilots to acquire and maintain adequate partial-panel flight skills, and be cautioned not to be overly reliant upon the gyro-instrument system(s).

☐ 4. Demonstrate and simultaneously explain a simulated emergency operation of a no radar, partial panel (no AI and HI) instrument landing from en route, using a standard nonprecision (NDB,VOR, LOC) instrument approach procedure, with operating NAV/COM and primary flight instruments.

PILOT'S ACTIONS

☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.

☐ 2. Read the section "Gyroscopic Instruments",and "No-Gyro Approach" in AC 61-27C.

☐ 3. Practice preflight inspection to verify all gyroscopic instruments are operating and accurate. Review the function, control, and power sources of each gyro. Review CFR's regarding any malfunctions.

☐ 4. Complete supervised practice of a no radar, partial panel (No AI or HI) instrument approach.

COMPLETION STANDARDS

☐ 1. Pilot has demonstrated the skill and understanding of the objective by performing a thorough inspection, and correctly adjusted and/or set, and properly utilized, the attitude indicator (AI), heading indicator (HI), and the turn coordinator (TC). Pilot is familiar with and has described the warning signs of impending gyro failure. Explained the probability of an unannounced and immediate failure of any or all of the gyroscopic instruments, and has demonstrated the appropriate action to be executed, including reports to ATC.

☐ 2. Pilot has demonstrated the required emergency attitude instrument flying skills by performing a no radar partial panel (no AI and HI), nonprecision instrument approach procedure in simulated IMC.

REFERENCES

AC 61-27C	Instrument Flying Handbook (35)	POH	Pilot's Operating Handbook
CFR	Part 61, and Part 91	IEOG	The Attitude Indicator # 24

DATE

No-Gyro Radar Vectoring and Approach Procedures

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

☐ Discuss Lesson Objective	.3
☐ Demonstration of No-Gyro Procedures	.4
☐ Pilot Operation, Trial and Practice	3.0
☐ Postflight Critique and Discussion	.2
☐ Preview of Next Lesson	.1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ IFR App. and Low Alt. Charts, SIDs, and STARs
- ☐ View Limiting Device (IFR Hood)
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries

OBJECTIVE

To determine that the pilot applicant:

1. ☐ Exhibits adequate knowledge of radar vectoring and no-gyro approach procedures including pilot and controller responsibilities.
2. ☐ Recognizes when the heading indicator is inaccurate or inoperative, advises the controller, and requests no-gyro vectors and approach procedure.
3. ☐ Sets correctly the communications and navigation equipment.
4. ☐ Acknowledges all headings, altitudes (departing and assigned), altimeter settings, and complies with the controller's instructions.
5. ☐ Makes all turns, while being vectored, at standard or half-standard rate as directed by the controller.
6. ☐ Executes promptly all "TURN RIGHT/LEFT" and "STOP TURN" commands issued by the controller.
7. ☐ Maintains, while being vectored, altitude within ±100 feet and airspeed within ±10 knots.
8. ☐ Maintains, when reached, the civil radar instrument approach minimums within +100 feet, −0 feet.
9. ☐ Sets correctly the communications, navigation, and transponder equipment.

NOTE: This is not a required PTS flight operation.

ELEMENTS

- ☐ 1. no-gyro approach (AI and HI inoperative)
- ☐ 2. Magnetic compass primary for heading
- ☐ 3. Airport Surveillance Radar (ASR)
- ☐ 4. Precision Approach Radar (PAR)
- ☐ 5. PAR has azimuth and glide path data
- ☐ 6. Term no-gyro is wrong, pilot will need TC
- ☐ 7. Two way communication is a prerequisite
- ☐ 8. Partial panel flight technique and procedure

COMMON ERRORS

- ☐ 1. Fixation and/or omission in scanning
- ☐ 2. Ignored checklist procedures or item(s)
- ☐ 3. ATC instructions, failure to act or respond
- ☐ 4. Excessive airspeed and loss of altitude

INSTRUCTOR'S ACTIONS

1. ☐ Explain and discuss the lesson elements, objective, and the required knowledge criteria.
2. ☐ Direct pilot to read the section "Gyroscopic Instruments" and "Approaches" in AC 61-27C.
3. ☐ Explain that for no-gyro vectoring, there are two basic types of procedures, ASR (nonprecision surveillance) which provides course and range information and PAR (precision) which provides precise course, glide slope, and range information.
4. ☐ Explain and direct pilot practice of a no-gyro approach (ASR). Pilot will advise ATC/CFII that HI has failed and request a no-gyro approach. Pilot will advise ATC/CFII type of airplane, KIAS, altitude, and last known heading. Pilot will establish airplane in approach configuration and KIAS in accordance with AFM. ATC/CFII will advise pilot of position and range to the runway to which the approach will be made, if a straight-in approach is being made, and the MAP. Inform pilot that all turns are to be at standard rate until final, and then at half standard rate. ATC/CFII informs pilot to initiate turns immediately upon hearing the words "turn right" or "turn left." Stop the turn on receipt of the words "stop turn", and give instructions for the missed approach procedure. Pilot requests altitude data, ATC/CFII informs pilot that ATC/CFII will issue **recommended altitudes** each mile, based on the descent gradient established for the procedure, down to the last mile, which is at or above the published MDA. Procedure is predicated on continuing two-way communications.
5. ☐ Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

1. ☐ Read the section "Gyroscopic Instruments" and "Approaches" in AC 61-27C.
2. ☐ Practice setting approach configuration and KIAS, receiving, acknowledging, and promptly complying. Never sacrifice airplane control to acknowledge receipt of any ATC instructions.

COMPLETION STANDARDS

1. ☐ Pilot has explained the procedures used to confirm the operational failure of gyroscopic instruments (AI and/or HI), and made the request to ATC for a no-gyro approach. and the pilot/controller duties, and all of the techniques and skills needed to successfully complete a no-gyro approach.
2. ☐ Pilot has performed a simulated IMC, no-gyro radar vectored approach procedure, while adhering to the objective flight performance criteria with competent partial panel flight skills.

REFERENCES

AC 61-27C	Instrument Flying Handbook (215)	CFR	Part 61, and Part 91
AC 61-21A	Flight Training Handbook (188)	AIM	Aeronautical Information Manual (5-49)

DATE

Instruments and Equipment, Checking

Postflight Procedures

Practical Test Standards - Task Lesson Plan

PILOT APPLICANT

SCHEDULE

- ☐ Discuss Lesson Objective .2
- ☐ Demonstration of Postflight Procedures .5
- ☐ Pilot Operation, Trial and Practice .7
- ☐ Postflight Critique and Discussion .2
- ☐ Preview of Next Lesson .1

All Times Are Estimated Depending On Pilot's Ability

EQUIPMENT

- ☐ Airplane, Airworthy, IFR Equipped and Certified
- ☐ FAA-Approved Airplane Flight Manual (AFM)
- ☐ Aircraft Radio(s), NAV/COM Systems
- ☐ Pilot Clip/Lapboard – Flashlight and Batteries
- ☐ Manufacturer's Operating Instructions
- ☐ Manufacturer's Recommended Checklist

OBJECTIVE

To determine that the applicant:

- ☐ 1. Exhibits adequate knowledge of the elements relating to all navigation equipment for proper operation.
- ☐ 2. Notes all flight equipment for proper operation.
- ☐ 3. Notes all equipment and/or aircraft malfunctions and makes a written record of improper operation or failure of such equipment.

ELEMENTS

- ☐ 1. Maintenance inspection periods verified
- ☐ 2. Electrical gauges and circuit breakers check
- ☐ 3. FAA approved equipment list
- ☐ 4. Manufacturer's recommended checklist
- ☐ 5. Manufacturer's operating instructions
- ☐ 6. Navigation equipment operation check
- ☐ 7. Communication equipment operation check
- ☐ 8. Flight instruments and accuracy check
- ☐ 9. Engine gauges and controls check
- ☐ 10. Malfunctions recorded and operator advised

COMMON ERRORS

- ☐ 1. Discrepancy record or notification not made
- ☐ 2. Postflight procedures ignored
- ☐ 3. Checklist and/or item(s) bypassed
- ☐ 4. Inoperable equipment not placarded
- ☐ 5. Placards required by CFR are not posted
- ☐ 6. Airplane equipment list unavailable
- ☐ 7. Minimum equipment list not approved
- ☐ 8. Avionics equipment instructions absent
- ☐ 9. Cockpit control locks not installed
- ☐ 10. Securing airplane checklist disregarded

INSTRUCTOR'S ACTIONS

- ☐ 1. Explain and discuss the lesson elements, objective, and the required knowledge criteria.
- ☐ 2. Direct pilot to read and study the material stated in the Pilot's Actions section.
- ☐ 3. Demonstrate and explain the function, purpose, and utilization of all navigation equipment aboard the airplane. With the increased capabilities and complexities of operation the pilot must be thoroughly familiar with the manufacturer's operation instructions, for reliable application.
- ☐ 4. Demonstrate and explain just how a thorough postflight check should be conducted. Use of manufacturer's recommended procedures, a detailed written checklist, and a current equipment list is strongly suggested. The primary benefit of a postflight check is safety; and may eliminate the possibility of a known and potentially dangerous malfunction or discrepancy from being overlooked on the next preflight. Additionally, it's a common courtesy to the next PIC. The check must include all instruments and equipment installed on or aboard the the airplane, whether required by CFR or not. The PIC must create a written record of any improper operation and/or the failure or discrepancy of any equipment, and notify the airplane operator immediately of any and all malfunction(s) that must be corrected prior to the next flight. This will eliminate the possibility of a PIC having to make a poor go/no-go decision, and may prevent the cancellation of a scheduled flight. Pilots must make it a habit to allow adequate time for the completion of a systematic postflight instrument and equipment check, and effectively and prominently record the results in the cockpit log and insure the notification of the airplane operator.
- ☐ 5. Conduct postflight critique, review procedures and techniques, and preview next lesson.

PILOT'S ACTIONS

- ☐ 1. Participate in discussion of objective, listen, take notes, and ask questions.
- ☐ 2. Read and comprehend CFR, Part 91, Subpart C–Equipment, Instruments, and Certificate Requirements.
- ☐ 3. Practice the habit of allotting time to complete a postflight check of instruments and equipment, with the aid of manufacturer's checklist or operator's detailed checklist, which should include all instruments and equipment aboard the airplane, and make notification of any malfunctions to operator.

COMPLETION STANDARDS

- ☐ 1. Pilot has demonstrated an awareness of the purpose and importance of the required postflight checking instruments and equipment procedures by habitually noting and/or placarding any required equipment pursuant to CFR's, in particular, any item that may compromise the safety of flight, and furnished notification to operator.

REFERENCES

POH	Pilot's Operating Handbook.	CFR, Part 61	Certification Of Pilots and Flight Instructors
AIM	Aeronautical Information Manual.	CFR, Part 91	General Operating and Flight Rules

Power and Performance Data Sheet

" ATTITUDE + POWER = PERFORMANCE "

AIRPLANE _____ N-#_____

FLY By The NUMBERS	Manifold Pressure	RPM	Pitch Attitude	IAS	VSI	Flaps	Gear
Departure Climb							
Cruise Climb							
Normal Cruise							
Descent Cruise							
Approach Cruise							
Approach Descent Precision							
Steep Descent Nonprecision							
Minimum Controllable							
Landing Configuration							Down & Locked

Note I

Not all of the above configurations are applicable for all airplanes. The instructor should select or advise pilot of the suitable configurations based on the type of airplane and the manufacturer's recommendations.

Stall - Landing Configuration	V_{SO}	_____	Maximum Flap Extended Speed	V_{FE}	_____
Best Angle Of Climb	V_X	_____	Landing Gear Extended Speed	V_{LE}	_____
Best Rate Of Climb	V_Y	_____	Landing Gear Operating Speed	V_{LO}	_____
Design Crusing Speed	V_C	_____	Maneuvering Speed	V_A	_____

Note II

It is imperative that each instrument pilot have a visual reference and awareness of the specific power and pitch (attitude) settings, as well as the wing flaps and landing gear deployment for each required flight regime or operation desired. It is better to use the "dot" than the "bar widths" for setting pitch attitude on the attitude indicator. This is because the "dot" of the symbolic aircraft's fuselage is always in the proper position for this use – the "bar" of the wings cannot be used for setting pitch when the airplane is banked.

The pilot should determine the above Power and Performance Data for every airplane that is to be flown in instrument conditions.

The confident precise instrument pilot, has developed the habit of "flying by the numbers".

Title 14 of the Code of Federal Regulations (14 CFR) Part 61

Instrument Rating (Airplane) FAA Eligibility Requirements

Adapted Excerpts

§61.65 INSTRUMENT RATING REQUIREMENTS

(a) **General.** A person who applies for an instrument rating must:

(1) Hold at least a current private pilot certificate with an airplane, helicopter, or powered-lift rating appropriate to the instrument rating sought;

(2) Be able to read, speak, write, and understand the English language. If the applicant is unable to meet any of these requirements due to a medical condition, the Administrator may place such operating limitations on the applicant's pilot certificate as are necessary for the safe operation of the aircraft;

(3) Receive and log ground training from an authorized instructor or accomplish a home-study course of training on the aeronautical knowledge areas of paragraph (b) of this section that apply to the instrument rating sought;

(4) Receive a logbook or training record endorsement from an authorized instructor certifying that the person is prepared to take the required knowledge test;

(5) Receive and log training on the areas of operation of paragraph (c) of this section from an authorized instructor in an aircraft, flight simulator, or flight training device that represents an airplane, helicopter, or powered-lift appropriate to the instrument rating sought;

(6) Receive a logbook or training record endorsement from an authorized instructor certifying that the person is prepared to take the required practical test;

(7) Pass the required knowledge test on the aeronautical knowledge areas of paragraph (b) of this section; however, an applicant is not required to take another knowledge test when that person already holds an instrument rating; and

(8) Pass the required practical test on the areas of operation in paragraph (c) of this section in–

(i) An airplane, helicopter, or powered-lift appropriate to the rating sought; or

(ii) A flight simulator or a flight training device appropriate to the rating sought and for the specific maneuver or instrument approach procedure performed. If an approved flight training device is used for the practical test, the instrument approach procedures conducted in that flight training device are limited to one precision and one nonprecision approach, provided the flight training device is approved for the procedure performed.

(b) **Aeronautical knowledge.** A person who applies for an instrument rating must have received and logged ground training from an authorized instructor or accomplished a home-study course on the following aeronautical knowledge areas that apply to the instrument rating sought:

(1) Federal Aviation Regulations of this chapter that apply to flight operations under IFR;

(2) Appropriate information that applies to flight operations under IFR in the "Aeronautical Information Manual";

(3) Air traffic control system and procedures for instrument flight operations;

(4) IFR navigation and approaches by use of navigation systems;

(5) Use of IFR en route and instrument approach procedure charts;

(6) Procurement and use of aviation weather reports and forecasts and the elements of forecasting weather trends based on that information and personal observation of weather conditions;

(7) Safe and efficient operation of aircraft under instrument flight rules and conditions;

(8) Recognition of critical weather situations and windshear avoidance;

(9) Aeronautical decision making and judgment; and

(10) Crew resource management, including crew communication and coordination.

(c) **Flight proficiency.** A person who applies for an instrument rating must receive and log training from an authorized instructor in an aircraft, or in a flight simulator or flight training device, in accordance with paragraph (e) of this section, that includes the following areas of operation:

(1) Preflight preparation;

(2) Preflight procedures;

(3) Air traffic control clearances and procedures;

(4) Flight by reference to instruments;

(5) Navigation systems;

(6) Instrument approach procedures;

(7) Emergency operations; and

(8) Postflight procedures.

(d) **Aeronautical experience.** A person who applies for an instrument rating must have logged the following:

(1) At least 50 hours of cross-country flight time as pilot in command, of which at least 10 hours must be in airplanes for an instrument–airplane rating; and

(2) A total of 40 hours of actual or simulated instrument time on the areas of operation of this section, to include–

(i) At least 15 hours of instrument flight training ⇕

from an authorized instructor in the aircraft category for which the instrument rating is sought;

(ii) At least 3 hours of instrument training that is appropriate to the instrument rating sought from an authorized instructor in preparation for the practical test within the 60 days preceding the date of the test;

(iii) For an instrument–airplane rating, instrument training on cross-country flight procedures specific to airplanes that includes at least one cross-country flight in an airplane that is performed under IFR, and consists of–

(A) A distance of at least 250 nautical miles along airways or ATC-directed routing;

(B) An instrument approach at each airport; and

(C) Three different kinds of approaches with the use of navigation systems;

(e) Use of flight simulators or flight training devices. If the instrument training was provided by an authorized instructor in a flight simulator or flight training device–

(1) A maximum of 30 hours may be performed in that flight simulator or flight training device if the training was accomplished in accordance with part 142 of this chapter; or

(2) A maximum of 20 hours may be performed in that flight simulator or flight training device if the training was not accomplished in accordance with part 142 of this chapter.

Source: Summit Aviation's *Computerized Aviation Reference Library*-000301

Author's
Personal Computer-Based Aviation Training Devices (PCATDs)
Research Instruction Notes

The Federal Aviation Administration issued AC 61-126 May 12, 1997, which establishes the approval criteria for, and use of, Personal Computer-Based Aviation Training Devices (PCATDs), which may be utilized under the provisions of Title 14 of the Code of Federal Regulations (14 CFR) Parts 61 and 141. **Pilot applicants can log 10 hours of flight time towards the existing requirements for the Instrument Rating.** In addition, there is unlimited potential for ground training of Aeronautical Knowledge requirements for Recreational, Private, Commercial pilot, and/or the Instrument Rating. PCATDs may be used for advanced training ground school such as Multi-Engine, High-Performance Airplanes, Complex Airplanes, and even Jet Aircraft familiarization.

Approved PCATD systems are a significant technological advancement for flight instructors and pilot applicants alike. The PCATD training simulation aid is an incredible knowledge and skill development vehicle, with real training cost effectiveness at an affordable cost for individual pilots. The PCATD systems will provide the greatest amount of aeronautical training, at the lowest cost, in the most comprehensible manner, in the shortest period of time, while training in a completely safe environment. If pilot applicants intend to develop their maximum flight skills and proficiency potential, while enhancing their self confidence and ensuring their ultimate safety, a PCATD system is absolutely essential.

After extensive experiments with several presentation methods and techniques for the introduction and demonstration of the **Instrument Rating PTS Task Lesson Plans** in this handbook, and while evaluating the various approved PCATD systems, it was repeatedly established, and the results strongly support or suggest that to achieve **"maximum pilot applicant knowledge acquisition, and effective flight skill development"** the following instructional planning, procedures, and systems must be utilized.

1. Instructors must:
   a. Use detailed written lesson plans designed for the learning characteristics of the individual pilot applicant;
   b. Be thoroughly familiar with the instructional operation of the PCATD system, and all of its capabilities; and
   c. Use graphical instructor's station to aid in the realistic simulation of ATC directed IFR flights, while emphasizing the continued use of checklist.
2. Pilot Applicant must:
   a. Participate in pre-lesson briefing, and at minimum have a clear understand of the lesson objective, elements, and completion standards;
   b. Learn the basic functions, capabilities, of the PCATD system; and
   c. Should have access to the PCATD system for unlimited practice of lessons.
3. Aviation Teachware Technologies ELITE™ PCATD proved to be the superior system tested for the following reasons, and is therefore strongly recommended: ⧫

a. ELITE™ PCATD has a selection of several single engine and two multi-engine airplane photorealistic panels with actual aerodynamic data for each programmed into the most sophisticated software available and tested;
b. ELITE™ PCATD provides a separate graphical instructor's station (Macintosh system only), allowing the instructor to induce failures while the pilot applicant is flying with a separate computer monitor.
c. ELITE™ PCATD had the greatest flexibility in customizing the panels from a basic DG, fixed-card ADF, and OBS to choosing a more sophisticated setup with RMI, HSI, autopilot, and GPS. Also the ELITE™ PCATD was the only system that could run on DOS, Windows® 95, or Apple Macintosh®.

Ed Quinlan, Author

Instructors and Pilot Applicants
For information about the
ELITE™ PCATD systems,
contact the following:

Aviation Teachware Technologies
P.O. Box 4837, Winter Park, FL 32793
TEL 407-277-7700
FAX 407-277-7623, or
Internet: www.flyelite.com

Regulation Note

Title 14 of the Code of Federal Regulations (14 CFR) Part 61.4

§61.4 Qualification and approval of flight simulators and flight training devices.
(a) Except as specified in paragraph (b) or (c) of this section, each flight simulator and flight training device used for training, and for which an airman is to receive credit to satisfy any training, testing, or checking requirement under this chapter, must be qualified and approved by the Administrator for -
  (1) The training, testing, and checking for which it is used;
  (2) Each particular maneuver, procedure, or crewmember function performed; and
  (3) The representation of the specific category and class of aircraft, type of aircraft, particular variation within the type of aircraft, or set of aircraft for certain flight training devices.
(b) Any device used for flight training, testing, or checking that has been determined to be acceptable to or approved by the Administrator prior to August 1, 1996, which can be shown to function as originally designed, is considered to be a flight training device, provided it is used for the same purposes for which it was originally accepted or approved and only to the extent of such acceptance or approval.
(c) The Administrator may approve a device other than a flight simulator or flight training device for specific purposes.

Instrument Rating Flight Training Task (Maneuvers and Procedures)
Airplane Single-Engine Checklist

• Preflight Preparation and Procedures

- ☐ Weather Information and Briefing
- ☐ Weight and Balance Computed
- ☐ Fuel and Performance Data
- ☐ Cross-Country Flight Planing
- ☐ Minimum Equipment List Check
- ☐ Flight Instruments Check
- ☐ Navigation Equipment Check
- ☐ Airplane Preflight Inspection
- ☐ Cockpit Check and Management

• Air Traffic Control Clearances and Procedures

- ☐ ATIS/Ground Control
- ☐ Clearance (Pre-Taxi Procedure)
- ☐ Tower Control
- ☐ Departure Control
- ☐ ARTCC - En Route Control
- ☐ Arrival/Approach Control

• Eight Basic Flight Configurations • Attitude + Power = Performance

- ☐ Departure Climb
- ☐ Approach Descent
- ☐ Cruise Climb
- ☐ Steep Descent
- ☐ Normal Cruise
- ☐ Minimum Controllable
- ☐ Approach Cruise
- ☐ Landing

• Primary Instrument Reference Flight Maneuvers

- ☐ Straight-and-Level Flight
- ☐ Straight-and-Level Flight - With Change Of Airspeed To Approach Speed
- ☐ Straight-and-Level Flight - With Change Of Airspeed To Minimum Controllable Airspeed

- ☐ Climbs - To Specified Altitudes
- ☐ Climbs - At Constant Airspeed (ASI)
- ☐ Climbs - At Constant Rate Of Climb (VSI)
  Minimum Rate 500 FPM
- ☐ Descents - To Specified Altitudes
- ☐ Descents - At Constant Airspeed (ASI)
- ☐ Descents - At Constant Rate Of Descent (VSI)
  Minimum Rate 500 FPM

- ☐ Turns - Level Flight To Specified Headings
- ☐ Turns - Changing Airspeed To Approach Speed
- ☐ Turns - Climbing To Specified Altitude and Heading
- ☐ Turns - Descending To Specified Altitude and Heading
- ☐ Turns - Timed To Magnetic Compass Headings
- ☐ Turns - Steep - 45° Constant – Airspeed/Altitude/Bank

• Unusual (Critical) Flight Attitudes – Recovery Procedures - (Partial Panel - No AI)

- ☐ Unusual Attitudes - Nose Low Recovery
- ☐ Unusual Attitudes - Nose High Recovery

• Radio Navigation Aids/Orientation and Position Identification

- ☐ VOR/VORTAC - Determines Accurately The Radial Of The Station and Aircraft Position
- ☐ VOR/VORTAC - Intercepts At Predetermined Angle and Tracks A Specific Radial
- ☐ NDB - Determines Accurately Relative Bearing Of The Facility and Aircraft Position
- ☐ NDB - Intercepts and Tracks A Specific Bearing Of An Assigned Facility
- ☐ DME ARC - Intercepts and Tracks A Specified Course

• Loss Of Gyro Attitude and/or Heading Indicators

- ☐ No-Gyro Radar Vectoring and Approach Procedures - (Partial Panel In-Flight Maneuvering)

• Holding Patterns and Entry Procedures

- ☐ VOR
- ☐ Teardrop Entry
- ☐ NDB
- ☐ Parallel Entry
- ☐ OM/LOC
- ☐ Direct Entry
- ☐ Intersection
- ☐ Non-Standard Turn

• Instrument Transitions and Approach Procedures

- ☐ ILS Procedure Turn
- ☐ VOR Procedure Turn
- ☐ ADF Procedure Turn
- ☐ ILS Approach
- ☐ ILS Radar Vectors
- ☐ VOR Radar Vectors
- ☐ ADF Radar Vectors
- ☐ VOR Approach
- ☐ ILS DME/ARC
- ☐ VOR DME/ARC
- ☐ ADF DME/ARC
- ☐ ADF Approach
- ☐ ILS Missed Approach
- ☐ VOR Missed Approach
- ☐ ADF Missed Approach
- ☐ Circling Approach

• Emergency Procedures (Simulated)

- ☐ Communication Failure
- ☐ Electrical System Failure
- ☐ Engine Failure
- ☐ Vacuum System Failure

• Landings

- ☐ Landing From A Straight-In Approach
- ☐ Circle-To-Land Approach and Landing

• Postflight

- ☐ Checking Instruments and Equipment
- ☐ Parking and Securing Airplane

The following pilot applicant has received the above indicated aeronautical training, and the following CFI-IA certifies that the pilot applicant was given the above indicated flight training and found competent to perform each pilot operation as an instrument pilot, and has endorsed the pilot's reliable record or logbook accordingly.

CFI-IA - Signature - Date

Pilot Applicant - Signature - Date

Pilot
Stall and Spin
Awareness Training

Table Of Contents

GROUND TRAINING - STALL AND SPIN AWARENESS

1. DEFINITIONS.

A stall is a loss of lift and increase in drag that occurs when an aircraft is flown at an angle of attack greater than the angle for maximum lift. If recovery from a stall is not effected in a timely and appropriate manner by reducing the angle of attack, a secondary stall and/or a spin may result. All spins are preceded by a stall on at least part of the wing. The angle of the relative wind is determined primarily by the aircraft's airspeed. Other factors are considered, such as aircraft weight, center of gravity, configuration, and the amount of acceleration used in a turn. The speed at which the critical angle of the relative wind is exceeded is the stall speed. Stall speeds are listed in the Airplane Flight Manual (AFM) or the Pilot Operating Handbook (POH) and pertain to certain conditions or aircraft configurations, e.g., landing configuration. Other specific operational speeds are calculated based upon the aircraft's stall speed in the landing configuration. Airspeed values specified in the AFM or POH may vary under different circumstances. Factors such as weight, center of gravity, altitude, temperature, turbulence, and the presence of snow, ice, or frost on the wings will affect an aircraft's stall speed. To thoroughly understand the stall/spin phenomenon, some basic factors affecting aircraft aerodynamics and flight should be reviewed with particular emphasis on their relation to stall speeds. (This advisory circular is principally concerned with and discusses airplanes. However, much of the information also is applicable to gliders.) The following terms are defined as they relate to stalls/spins.

a. **Angle of Attack (AOA).** Angle of attack, is the angle at which the wing meets the relative wind. The angle of attack must be small enough to allow attached airflow over and under the airfoil to produce lift. A change in angle of attack will affect the amount of lift that is produced. An excessive angle of attack will eventually disrupt the flow of air over the airfoil. If the angle of attack is not reduced, a section of the airfoil will reach its critical angle of attack, lose lift, and stall. Exceeding the critical angle of attack for a particular airfoil section will always result in a stall.

b. **Airspeed.** Airspeed is controlled primarily by the elevator or longitudinal control position for a given configuration and power. If an airplane's speed is too slow, the angle of attack required for level flight will be so large that the air can no longer follow the upper curvature of the wing. The result is a separation of airflow from the wing, loss of lift, a large increase in drag, and eventually a stall if the angle of attack is not reduced. The stall is the result of excessive angle of attack - not airspeed. A stall can occur at any airspeed, in any attitude, and at any power setting.

c. **Configuration.** Flaps, landing gear, and other configuring devices can affect an airplane's stall speed. Extension of flaps and/or landing gear in flight will usually increase drag. Flap extension will generally increase the lifting ability of the wings, thus reducing the airplane's stall speed. The effect of flaps on an airplane's stall speed can be seen by markings on the airplane's airspeed indicator, where the lower airspeed limit of the white arc (power-off stall speed with gear and flaps in the landing configuration) is less than the lower airspeed limit of the green arc (power-off stall speed in the clean configuration).

d. V_{SO}. V_{SO} means the stall speed or the minimum steady flight speed in the landing configuration.

e. V_{S1}. V_{S1} means the stall speed or the minimum steady flight speed obtained in the specific configuration.

f. V_A. V_A is the design maneuvering speed which is the speed at which an airplane can be stalled without exceeding its structural limits.

g. **Load Factor.** Load factor is the ratio of the lifting force produced by the wings to the actual weight of the airplane and its contents. Load factors are usually expressed in terms of "G." The aircraft's stall speed increases in proportion to the square root of the load factor. For example, an airplane that has a normal unaccelerated stall speed of 45 knots can be stalled at 90 knots when subjected to a load factor of 4 G's. The possibility of inadvertently stalling the airplane by increasing the load factor (by putting the airplane in a steep turn or spiral, for example) is therefore much greater than in normal cruise flight. A stall entered from straight and level flight or from an unaccelerated straight climb will not produce additional load factors. In a constant rate turn, increased load factors will cause an airplane's stall speed to increase as the angle of bank increases. Excessively steep

banks should be avoided because the airplane will stall at a much higher speed or, if the aircraft exceeds maneuvering speed, structural damage to the aircraft may result before it stalls. If the nose falls during a steep turn, the pilot might attempt to raise it to the level flight attitude without shallowing the bank. This situation tightens the turn and can lead to a diving spiral. A feeling of weightlessness will result if a stall recovery is performed by abruptly pushing the elevator control forward, which will reduce the up load on the wings. Recoveries from stalls and spins involve a tradeoff between loss of altitude (and an increase in airspeed) and an increase in load factor in the pullup. However, recovery from the dive following spin recovery generally causes higher airspeeds and consequently higher load factors than stall recoveries due to the much lower position of the nose. Significant load factor increases are sometimes induced during pullup after recovery from a stall or spin. It should be noted that structural damage can result from the high load factors imposed by intentional stalls practiced above the airplane's design maneuvering speed.

h. **Center of Gravity (CG).** The CG location has an indirect effect on the effective lift and angle of attack of the wing, the amount and direction of force on the tail, and the degree of stabilizer deflection needed to supply the proper tail force for equilibrium. The CG position, therefore, has a significant effect on stability and stall/spin recovery. As the CG is moved aft, the amount of elevator deflection will be reduced. An increased angle of attack will be achieved with less elevator control force. This could make the entry into inadvertent stalls easier, and during the subsequent recovery, it would be easier to generate higher load factors, due to the reduced forces. In an airplane with an extremely aft CG, very light back elevator control forces may lead to inadvertent stall entries and if a spin is entered, the balance of forces on the airplane may result in a flat spin. Recovery from a flat spin is often impossible. A forward CG location will often cause the stalling angle of attack to be reached at a higher airspeed. Increased back elevator control force is generally required with a forward CG location.

i. **Weight.** Although the distribution of weight has the most direct effect on stability, increased gross weight can also have an effect on an aircraft's flight characteristics, regardless of the CG position. As the weight of the airplane is increased, the stall speed increases. The increased weight requires a higher angle of attack to produce additional lift to support the weight.

j. **Altitude and Temperature.** Altitude has little or no effect on an airplane's indicated stall speed. Thinner air at higher altitudes will result in decreased aircraft performance and a higher true airspeed for a given indicated airspeed. Higher than standard temperatures will also contribute to increased true airspeed. However, the higher true airspeed has no effect on indicated approach or stall speeds. The manufacturer's recommended indicated airspeeds should therefore be maintained during the landing approach, regardless of the elevation or the density altitude at the airport of landing.

k. **Snow, Ice, or Frost on the Wings.** Even a small accumulation of snow, ice, or frost on an aircraft's surface can cause an increase in that aircraft's stall speed. Such accumulation changes the shape of the wing, disrupting the smooth flow of air over the surface and, consequently, increasing drag and decreasing lift. Flight should not be attempted when snow, ice, or frost has accumulated on the aircraft surfaces.

l. **Turbulence.** Turbulence can cause an aircraft to stall at a significantly higher airspeed than in stable condition. A vertical gust or windshear can cause a sudden change in the relative wind, and result in an abrupt increase in angle of attack. Although a gust may not be maintained long enough for a stall to develop, the aircraft may stall while the pilot is attempting to control the flightpath, particularly during an approach in gusty condition. When flying in moderate to severe turbulence or strong crosswinds, a higher than normal approach speed should be maintained. In cruise flight in moderate or severe turbulence, an airspeed well above the indicated stall speed and below maneuvering speed should be used.

2. DISTRACTIONS.

Improper airspeed management resulting in stalls are most likely to occur when the pilot is distracted by one or more other tasks, such as locating a checklist or attempting to restart after an engine failure; flying a traffic pattern on a windy day; reading a chart or making fuel and/or distance calculations; or attempting to retrieve items from the floor, back seat, or glove compartment. Pilots at all skill levels should be aware of the increased risk of entering into an inadvertent stall or spin while performing tasks that are secondary to controlling the aircraft.

3. STALL RECOGNITION.

There are several ways to recognize that a stall is impending before it actually occurs. When one or more of these indicators is noted, initiation of a recovery should be instinctive (unless a full stall is being practiced intentionally from an altitude that allows recovery above 1,500 feet above ground level (AGL) for single-engine airplanes and 3,000 feet AGL for multiengine airplanes). One indication of a stall is a mushy feeling in the flight controls and less control effect as the aircraft's speed is reduced. This reduction in control effectiveness is attributed in part to reduced airflow over the flight control surfaces. In fixed-pitch propeller airplanes, a loss of revolutions per minute (RPM) may be evident when approaching a stall in power-on conditions. For both airplanes and gliders, a reduction in the sound of air flowing along the fuselage is usually evident. Just before the stall occurs, buffeting, uncontrollable pitching, or vibrations may begin. Many aircraft are equipped with stall warning devices that will alert the pilot when the airflow over the wing(s) approaches a point that will not allow lift to be sustained. Finally, kinesthesia (the sensing of changes in direction or speed of motion), when properly learned and developed, will warn the pilot of a decrease in speed or the beginning of a "mushing" of the aircraft. These preliminary indications serve as a warning to the pilot to increase airspeed by adding power, and/or lowering the nose, and/or decreasing the angle of bank.

4. TYPES OF STALLS.

Stalls can be practiced both with and without power. Stalls should be practiced to familiarize the student with the aircraft's particular stall characteristics without putting the aircraft into a potentially dangerous condition. In multiengine airplanes, single-engine stalls must be avoided. A description of some different types of stalls follows:

a. Power-off stalls (also known as approach-to-landing stalls) are practiced to simulate normal approach-to-landing conditions and configuration. Many stall/spin accidents have occurred in these power-off situations, such as crossed control turns from base leg to final approach (resulting in a skidding or slipping turn); attempting to recover from a high sink rate on final approach by using only an increased pitch attitude; and improper airspeed control on final approach or in other segments of the traffic pattern.

b. Power-on stalls (also known as departure stalls) are practiced to simulate takeoff and climb-out conditions and configuration. Many stall/spin accidents have occurred during these phases of flight, particularly during go-arounds. A causal factor in such accidents has been the pilot's failure to maintain positive control due to a nose-high trim setting or premature flap retraction. Failure to maintain positive control during short field takeoffs has also been an accident causal factor.

c. Accelerated stalls can occur at higher-than-normal airspeeds due to abrupt and/or excessive control applications. These stalls may occur in steep turns, pullups, or other abrupt changes in flightpath. Accelerated stalls usually are more severe than unaccelerated stalls and are often unexpected because they occur at higher-than-normal airspeeds.

5. STALL RECOVERY.

The key factor in recovering from a stall is regaining positive control of the aircraft by reducing the angle of attack. At the first indication of a stall, the aircraft angle of attack must be decreased to allow the wings to regain lift. Every aircraft in upright flight may require a different amount of forward pressure to regain lift. It should be noted that too much forward pressure can hinder recovery by imposing a negative load on the wing. The next step in recovering from a stall is to smoothly apply maximum allowable power (if applicable) to increase the airspeed and to minimize the loss of altitude. Certain high performance airplanes may require only an increase in thrust and relaxation of the back pressure on the yoke to effect recovery. As airspeed increases and the recovery is completed, power should be adjusted to return the airplane to the desired flight condition. Straight and level flight should be established with full coordinated use of the controls. The airspeed indicator or tachometer, if installed, should never be allowed to reach their high-speed red lines at anytime during a practice stall.

6. SECONDARY STALLS.

If recovery from a stall is not made properly, a secondary stall or a spin may result. A secondary stall is caused by attempting to hasten the completion of a stall recovery before the aircraft has regained sufficient flying speed. When this stall occurs, the back elevator pressure should again be released just as in a normal stall recovery. When sufficient airspeed has been

regained, the aircraft can then be returned to straight-and-level flight.

7. SPINS.

A spin in a small airplane or glider is a controlled or uncontrolled maneuver in which the glider or airplane descends in a helical path while flying at an angle of attack greater than the angle of maximum lift. Spins result from aggravated stalls in either a slip or a skid. If a stall does not occur, a spin cannot occur. In a stall, one wing will often drop before the other and the nose will yaw in the direction of the low wing.

8. WEIGHT AND BALANCE.

Minor weight or balance changes can affect an aircraft's spin characteristics. For example, the addition of a suitcase in the aft baggage compartment will affect the weight and balance of the aircraft. An aircraft that may be difficult to spin intentionally in the utility category (restricted aft CG and reduced weight) could have less resistance to spin entry in the normal category (less restricted aft CG and increased weight) due to its ability to generate a higher angle of attack and increased load factor. Furthermore, an aircraft that is approved for spins in the utility category, but loaded in the normal category, may not recover from a spin that is allowed to progress beyond one turn.

9. PRIMARY CAUSE.

The primary cause of an inadvertent spin is exceeding the critical angle of attack for a given stall speed while executing a turn with excessive or insufficient rudder and, to a lesser extent, aileron. In an uncoordinated maneuver, the pitot/static instruments, especially the altimeter and airspeed indicator, are unreliable due to the uneven distribution of air pressure over the fuselage. The pilot may not be aware that a critical angle of attack has been exceeded until the stall warning device activates. If a stall recovery is not promptly initiated, the airplane is more likely to enter an inadvertent spin. The spin that occurs from cross controlling an aircraft usually results in rotation in the direction of the rudder being applied, regardless of which wing tip is raised. In a skidding turn, where both aileron and rudder are applied in the same direction, rotation will be in the direction the controls are applied. However, in a slipping turn, where opposite aileron is held against the rudder, the resultant spin will usually occur in the direction opposite the aileron that is being applied.

10. TYPES OF SPINS.

a. **An incipient spin** is that portion of a spin from the time the airplane stalls and rotation starts, until the spin becomes fully developed. Incipient spins that are not allowed to develop into a steady state spin are commonly used as an introduction to spin training and recovery techniques.

b. **A fully developed spin** occurs when the aircraft angular rotation rates, airspeed, and vertical speed are stabilized from turn-to-turn in a flightpath that is close to vertical.

c. **A flat spin** is characterized by a near level pitch and roll attitude with the spin axis near the CG of the airplane. Recovery from a flat spin may be extremely difficult and, in some cases, impossible.

11. SPIN RECOVERY.

Before flying any aircraft, in which spins are to be conducted, the pilot should be familiar with the operating characteristics and standard operating procedures, including spin recovery techniques, specified in the approved AFM or POH. The first step in recovering from an upright spin is to close the throttle completely to eliminate power and minimize the loss of altitude. If the particular aircraft spin recovery techniques are not known, the next step is to neutralize the ailerons, determine the direction of the turn, and apply full opposite rudder. When the rotation slows, briskly move the elevator control forward to approximately the neutral position. Some aircraft require merely a relaxation of back pressure; others require full forward elevator control pressure. Forward movement of the elevator control will decrease the angle of attack. Once the stall is broken, the spinning will stop. Neutralize the rudder when the spinning stops to avoid entering a spin in the opposite direction. When the rudder is neutralized, gradually apply enough aft elevator pressure to return to level flight. Too much or abrupt aft elevator pressure and/or application of rudder and ailerons during the recovery can result in a secondary stall and possibly another spin. If the spin is being performed in an airplane, the engine will sometimes stop developing power due to centrifugal force acting on the fuel in the airplane's tanks causing fuel interruption. It is, therefore, recommended to assume that power is not available when practicing spin recovery. As a rough

estimate, an altitude loss of approximately 500 feet per each 3-second turn can be expected in most small aircraft in which spins are authorized. Greater losses can be expected at higher density altitudes.

FLIGHT TRAINING - STALLS

12. STALL TRAINING.

Flight instructor-airplane and flight instructor-glider applicants must be able to give stall training. The flight instructor should emphasize that techniques and procedures for each aircraft may differ and that pilots should be aware of the flight characteristics of each aircraft flown. Single-engine stalls should not be demonstrated or practiced in multiengine airplanes. Engine-out minimum control speed demonstrations in multiengine airplanes should not be attempted when the density altitude and temperature are such that the engine-out minimum control speed is close to the stall speed, since loss of directional or lateral control could result. The flight training required by FAR Part 61 does not entail the actual practicing of spins for other than flight instructor-airplane and flight instructor-glider applicants, but emphasizes stall and spin avoidance. The most effective training method contained in Report No. FAA-RD-77-26 is the simulation of scenarios that can lead to inadvertent stalls by creating distractions while the student is practicing certain maneuvers. Stall demonstrations and practice, including maneuvering during slow flight and other maneuvers with distractions that can lead to inadvertent stalls, should be conducted at a sufficient altitude to enable recovery above 1,500 feet AGL in single-engine airplanes and 3,000 feet AGL in multiengine airplanes. The following training elements are based on Report No. FAA-RD-77-26:

a. Stall Avoidance Practice at Slow Airspeeds.

(1) Assign a heading and an altitude. Have the student reduce power and slow to an airspeed just above the stall speed, using trim as necessary.

(2) Have the student maintain heading and altitude with the **stall warning device activated.**

(3) **Demonstrate the effect of elevator trim** (use neutral and full nose-up settings) and rudder trim, if available.

(4) **Note the left turning tendency** and rudder effectiveness for lateral/directional control.

(5) **Emphasize how right rudder pressure is necessary to center the ball indicator** and maintain heading.

(6) Release the rudder and advise the student to observe to the left yaw.

(7) **Adverse yaw** demonstration. While at a low airspeed, have the student enter left and right turns without using rudder pedals.

(8) Have the student practice turns, climbs, and descents at low airspeeds.

(9) **Demonstrate the proper flap extension** and retraction procedures while in level flight to avoid a stall at low airspeeds. Note the change in stall speeds with flaps extended and retracted.

(10) **Realistic distractions** at low airspeeds. Give the student a task to perform while flying at a low airspeed. Instruct the student to divide his/her attention between the task and flying the aircraft to maintain control and avoid a stall. The following distractions can be used:

(i) **Drop a pencil.** Ask the student to pick it up. Ask the student to determine a heading to an airport using a chart.

(ii) Ask the student to reset the clock to **Universal Coordinated Time (UTC).**

(iii) Ask the student to get something from the back seat.

(iv) Ask the student to read the outside air temperature.

(v) Ask the student to call the Flight Service Station (FSS) for weather information.

(vi) Ask the student to compute true airspeed with a flight computer.

(vii) Ask the student to identify terrain or objects on the ground.

(viii) Ask the student to **identify a field suitable for a forced landing.**

(ix) Have the student climb 200 feet and maintain altitude, then descend 200 feet and maintain altitude.

(x) Have the student reverse course after a series of S-turns.

(11) Flight at low airspeeds with the airspeed indicator covered. Use various flap settings and distractions.

b. **Departure Stall.**

(1) At a safe altitude, have the student attempt coordinated power-on (departure) stalls straight ahead and in turns. Emphasize how these stalls could occur during takeoff.

(2) Ask the student to demonstrate a power-on (departure) stall and distract him/her just before the stall occurs. Explain any effects the distraction may have had on the stall or recovery.

c. **Engine Failure in a Climb Followed by a 180-Degree Gliding Turn.** This demonstration will show the student how much altitude the airplane loses following a power failure after takeoff and during a 180-degree turn back to the runway and why returning to the airport after losing an engine is not a recommended procedure. This can be performed using either a medium or steep bank in the 180-degree turn, but emphasis should be given to stall avoidance.

(1) Set up the best rate of climb(V_Y).

(2) Reduce power smoothly to idle as the airplane passes through a cardinal altitude.

(3) Lower the nose to maintain the best glide speed and make a 180-degree turn at the best glide speed.

(4) Point out the altitude loss and emphasize how rapidly airspeed decreases following a power failure in a climb attitude.

d. **Cross Controlled Stalls in Gliding Turns.** Perform stalls in gliding turns to simulate turns from base to final. Perform the stalls from a properly coordinated turn, a slipping turn, and a skidding turn. Explain the difference between slipping and skidding turns. Explain the ball indicator position in each turn and the aircraft behavior in each of the stalls.

e. **Power-off (Approach-To-Land-ing) Stalls.**

(1) Have the student perform a full-flap, gear extended, power-off stall with the correct recovery and cleanup procedures. Note the loss of altitude.

(2) Have the student repeat this procedure and distract the student during the stall and recovery and note the effect of the distraction. Show how errors in flap retraction procedure can cause a secondary stall.

f. **Stalls During Go-Arounds.**

(1) Have the student perform a full-flap, gear extended, power-off stall, then recover and attempt to climb with flaps extended. If a higher than normal climb pitch attitude is held, a secondary stall will occur. (In some airplanes, a stall will occur if a normal climb pitch attitude is held.)

(2) Have the student perform a full-flap, gear extended, power-off stall, then recover and retract the flaps rapidly as a higher than normal climb pitch attitude is held. A secondary stall or settling with a loss of altitude may result.

g. **Elevator Trim Stall.**

(1) Have the student place the airplane in a landing approach configuration, in a trimmed descent.

(2) After the descent is established, initiate a go-around by adding full power, holding only light elevator and right rudder pressure.

(3) Allow the nose to pitch up and torque to swerve the airplane left. At the first indication of a stall, recover to a normal climbing pitch attitude.

(4) Emphasize the importance of correct attitude control, application of control pressures, and proper trim during go-arounds.

FLIGHT TRAINING - SPINS

13. SPIN TRAINING.

Spin training is required for flight instructor-airplane and flight instructor-glider applicants only. Upon completion of the training, the applicant's logbook or training record should be endorsed by the flight instructor who provided the training. A sample endorsement of spin training for flight instructor applicants is available in AC 61-65, Certification: Pilots and Flight Instructors, current edition.

a. **Spin training must be accomplished in an aircraft that is approved for spins.** Before practicing intentional spins, the AFM or POH should be consulted for the proper entry and recovery techniques.

b. **The training should begin by practicing both power-on and power-off stalls** to familiarize the applicant with the aircraft's stall characteristics. Spin avoidance, incipient spins, and **actual spin entry, spin, and spin recovery techniques should be practiced from an altitude above 3,500 feet AGL.**

c. **Spin avoidance training should consist of stalls and maneuvering during slow flight using realistic distractions** such as those listed in Chapter 2. Performance is considered unsatisfactory if it becomes necessary for the instructor to take control of the aircraft to avoid a fully developed spin.

d. **Incipient spins** should be practiced to train the instructor applicant to recover from a student's poorly performed stall or unusual attitude that could lead to a spin.

(1) **Configure the aircraft for a power-on or power-off stall,** and continue to apply back elevator pressure. As the stall occurs, apply right or left rudder and allow the nose to yaw towards the stalled wing. Release the spin inducing controls and recover as the spin begins by applying opposite rudder and forward elevator pressure. The instructor should discuss control application in the recovery.

e. **Spin entry, spin, and spin recovery** should be demonstrated by the instructor and repeated, in both directions, by the applicant.

(1) **Apply the entry procedure** for a power-off stall. As the airplane approaches a stall, smoothly apply full rudder in the direction of desired spin rotation and continue to apply back elevator to the limit of travel. The ailerons should be neutral.

(2) **Allow the spin to develop,** and be fully recovered no later than one full turn. Observe the airspeed indicator during the spin and subsequent recovery to ensure that it does not reach the **red line** (Vne).

(3) **Follow the recovery procedures recommended by the manufacturer** in the AFM or POH. In most aircraft, spin recovery techniques consist of retarding power (if in a powered aircraft), applying opposite rudder to slow the rotation, neutralizing the ailerons, applying positive forward-elevator movement to break the stall, neutralizing the rudder as the spinning stops, and returning to level flight.

AIRWORTHINESS STANDARDS

14. OPERATING LIMITATIONS.

Operating limitations are imposed for the safety of pilots and their passengers. Operations contrary to these restrictions are a serious compromise of safety. It is, therefore, most important that all pilots, flight and ground instructors, and pilot examiners apply the following information on spinning to pilot training and flight operations.

a. **Normal Category.** Single-engine normal category airplanes are placarded against intentional spins. However, to provide a margin of safety when recovery from a stall is delayed, these airplanes are tested during certification and must be able to recover from a one-turn spin or a 3-second spin, whichever takes longer, in not more than one additional turn with the controls used in the manner normally used for recovery. In addition:

(1) For both the flaps-retracted and flaps-extended conditions, the applicable airspeed limit and positive limit maneuvering load factor may not be exceeded. For the flaps-extended condition, the flaps may be retracted during recovery;

(2) There may be no excessive back pressure during the spin recovery; and

(3) It must be impossible to obtain uncontrollable spins with any use of the controls.

Note: **Since airplanes certificated in the normal category have not been tested for more than a one-turn or 3-second spin, their performance characteristics beyond these limits are unknown. This is the reason they are placarded against intentional spins.**

b. **Acrobatic Category.** An acrobatic category airplane must meet the following requirements:

(1) **The airplane must recover from any point in a spin,** in not more than one and one-half additional turns after normal recovery application of the controls. Prior to normal recovery application of the controls, the spin test must proceed for six turns or 3 seconds, whichever takes longer, with flaps retracted, and one turn or 3 seconds, whichever takes longer, with flaps extended. However, beyond 3 seconds, the spin may be discontinued when spiral characteristics appear with flaps retracted.

(2) For both the flaps-retracted and flaps-extended conditions, the applicable airspeed limit and the positive limit maneuvering load factor may not be exceeded. For the flaps-extended condition, the flaps may be retracted during recovery, if a placard is installed prohibiting intentional spins with flaps extended.

(3) It must be impossible to obtain uncontrollable spins with any use of the controls.

Note: **Since airplanes certificated in the acrobatic category have not been tested for more than six turns or 3 seconds, their performance characteristics beyond these limits are unknown.**

c. **Utility Category.** A utility category airplane must meet the requirements for either the normal or acrobatic category.

15. PLACARDS.

Under CFR Section 23.1567, all airplanes type certificated under CFR Part 23 must have a flight maneuver placard containing the following information:

a. **For normal category airplanes,** there must be a placard in front of and in clear view of the pilot stating: "No acrobatic maneuvers, including spins, approved."

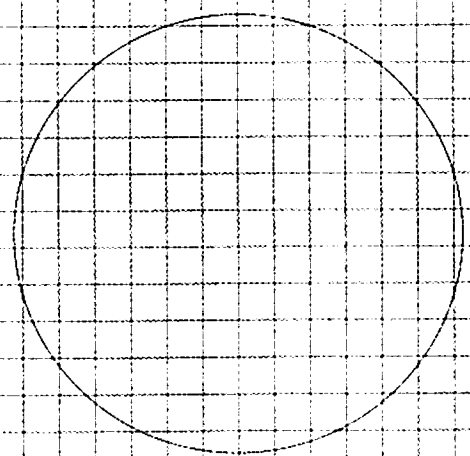
b. **Additionally, for those utility category** airplanes, with a certification basis after March 1978 and that do not meet the spin requirements for acrobatic category airplanes, there must be an additional placard in clear view of the pilot stating: "Spins Prohibited."

c. **For acrobatic category airplanes,** there must be a placard in clear view of the pilot listing the approved acrobatic maneuvers and the recommended entry airspeed for each. If inverted flight maneuvers are not approved, the placard must include a notation to this effect.

16. PILOT AWARENESS.

The pilot of an airplane placarded against intentional spins should assume that the airplane may become uncontrollable in a spin. In addition, stall warning devices should not be deactivated for pilot certification flight tests in airplanes for which they are required equipment.

Flight Notes



High–Altitude Flight • Pilot Training Syllabus and Outline

1. OBJECTIVE

This section presents a recommended outline for high-altitude pilot training that meets the requirements of CFR § 61.31(f). The actual training, which may be derived from this outline, should include both ground and flight training in high–altitude operations. Upon completion of the ground and flight training, the flight instructor who conducted the training should provide an endorsement in the pilot's logbook or training record, certifying that training in high–altitude operations was given. A sample high-altitude endorsement is available in the Special Reference Supplements, Certification: Pilots and Flight Instructors, AC 61-65.

a. Although CFR § 61.31(f) applies only to pilots who fly pressurized airplanes with a service ceiling or maximum operating altitude, whichever is lower, above 25,000 feet MSL, this training is recommended for all pilots who fly at altitudes above 10,000 feet MSL.

(1) A **service ceiling** is the maximum height above MSL at which an airplane can maintain a rate of climb of 100 feet per minute under normal conditions.

(2) **All pressurized airplanes** have a specified **maximum operating altitude** above which operation is not permitted. This maximum operating altitude is determined by flight, structural, powerplant, functional, or equipment characteristics. An airplane's maximum operating altitude is limited to 25,000 feet or lower unless certain airworthiness standards are met.

(3) **Maximum operating altitudes** and service ceilings are specified in the Airplane Flight Manual (AFM).

b. **The training outlined** in this section is designed primarily for airplanes that fly at high altitudes but do not require type ratings. The training should, however, be incorporated into type rating courses for aircraft that fly above 25,000 feet MSL if the pilot has not already received training in high–altitude flight. The training in this outline does not encompass high–speed flight factors such as acceleration, G–forces, MACH, and turbine systems that do not apply to reciprocating engine and turboprop aircraft. Information on high–speed flight can be found in the following section.

2. DISCUSSION

CFR Part 61 prescribes the knowledge and skill requirements for the various airman certificates and ratings, including category, class, and type ratings authorized to be placed thereon. The civil aircraft fleet consists of numerous aircraft capable of flight in the high-altitude environment. Certain knowledge elements pertaining to high-altitude flight are essential for the pilots of these aircraft. **Pilots who fly in this realm of flight must receive flight training in the critical factors relating to safe flight operations in the high-altitude environment.** These critical factors include knowledge of the special physiological and/or aerodynamic considerations which should be given to high performance aircraft operating in the high-altitude environment. The high-altitude environment has different effects on the human body than those experienced at the lower altitudes. The aerodynamic characteristics of an aircraft in high–altitude flight may differ significantly from those of aircraft operated at the lower altitudes.

3. DEFINITIONS

a. **Aspect Ratio** is the relationship between the wing chord and the wingspan. A short wingspan and wide wing chord equal a low aspect ratio.

b. **Drag Divergence** is a phenomenon that occurs when an airfoil's drag increases sharply and requires substantial increases in power (thrust) to produce further increases in speed. This is not to be confused with MACH crit. The drag increase is due to the unstable formation of shock waves that transform a large amount of energy into heat and into pressure pulses that act to consume a major portion of the available propulsive energy (thrust). Turbulent air may produce a resultant increase in the coefficient of drag.

c. **Force** is generally defined as the cause for motion or of change or stoppage of motion. The ocean of air through which an aircraft must fly has both mass and inertia and, thus, is capable of exerting tremendous forces on an aircraft moving through the atmosphere. When all of the above forces are equal, the aircraft is said to be in a state of equilibrium. For instance, when an aircraft is in level, unaccelerated 1 G flight, thrust

and drag are equal, and lift and gravity (or weight plus aerodynamic downloads on the aircraft) are equal. Forces that act on any aircraft as the result of air resistance, friction, and other factors are:

(1) **Thrust.** The force required to counteract the forces of drag in order to move an aircraft in forward flight.

(2) **Drag.** The force which acts in opposition to thrust.

(3) **Lift.** The force which sustains the aircraft during flight.

(4) **Gravity.** The force which acts in opposition to lift.

d. **MACH**, named after Ernst Mach, a 19th Century Austrian physicist, is the ratio of an aircraft's true speed as compared to the local speed of sound at a given time or place.

e. **MACH Buffet** is the airflow separation behind a shock-wave pressure barrier caused by airflow over flight surfaces exceeding the speed of sound.

f. **MACH (or Aileron) Buzz** is a term used to describe a shock-induced flow separation of the boundary layer air before reaching the ailerons.

g. **MACH Meter** is an instrument designed to indicate MACH number. MACH indicating capability is incorporated into the airspeed indicator(s) of current generation turbine-powered aircraft capable of MACH range speeds.

h. **MACH number** is a decimal number (M) representing the true airspeed (TAS) relationship to the local speed of sound (e.g., TAS 75 percent (.75M) of the speed of sound where 100 percent of the speed of sound is represented as MACH 1 (1.0M)). The local speed of sound varies with changes in temperature.

i. **MACH number (Critical)** is the free stream MACH number at which local sonic flow such as buffet, airflow separation, and shock waves becomes evident. These phenomena occur above the critical MACH number, often referred to as MACH crit. These phenomena are listed as follows:

SUBSONIC MACH Numbers below .75

TRANSONIC MACH Numbers from .75 to 1.20

SUPERSONIC MACH Numbers from 1.20 to 5.0

HYPERSONIC MACH Numbers above 5.0

j. **MACH Speed** is the ratio or percentage of the TAS to the speed of sound (e.g., 1,120 feet per second (660 Knots (K)) at MSL). This may be represented by MACH number.

k. **MACH Tuck** is the result of an aftward shift in the center of lift causing a nose down pitching moment.

l. **Mmo** (MACH, maximum operation) is an airplane's maximum certificated MACH number. Any excursion past Mmo, whether intentional or accidental, may cause induced flow separation of boundary layer air over the ailerons and elevators of an airplane and result in a loss of control surface authority and/or control surface buzz or snatch.

m. **Q-Corner or Coffin Corner** is a term used to describe operations at high altitudes where low indicated airspeeds yield high true airspeeds (MACH number) at high angles of attack. The high angle of attack (AOA) results in flow separation which causes buffet. Turning maneuvers at these altitudes increase the AOA and result in stability deterioration with a decrease in control effectiveness. The relationship of stall speed to MACH crit narrows to a point where sudden increases in AOA, roll rates, and/or disturbances; e.g., clear air turbulence, cause the limits of the airspeed envelope to be exceeded. Coffin Corner exists in the upper portion of the maneuvering envelope for a given gross weight and G-force.

n. **Vmo** (Velocity maximum operation) is an airplane's indicated airspeed limit. Exceeding Vmo may cause aerodynamic flutter and G-load limitations to become critical during the dive recovery.

4. OUTLINE

Additional information should be used to complement the training provided herein. The training outlined below, and explained in further detail in the

remainder of this section, covers the minimum information needed by pilots to operate safely at high altitudes.

a. Ground Training

(1) The High-Altitude Flight Environment

(i) Airspace
(ii) CFR

(2) Weather

(i) The atmosphere
(ii) Winds and clear air turbulence
(iii) Clouds and thunderstorms
(iv) Icing

(3) Flight Planning and Navigation

(i) Flight planning
(ii) Weather charts
(iii) Navigation
(iv) Navaids

(4) Physiological Training

(i) Respiration
(ii) Hypoxia
(iii) Effects of prolonged oxygen use
(iv) Decompression sickness
(v) Vision
(vi) Altitude chamber (optional)

(5) High–Altitude Systems and Components

(i) Turbochargers
(ii) Oxygen and oxygen equipment
(iii) Pressurization systems
(iv) High-altitude components

(6) Aerodynamics and Performance Factors

(7) Emergencies

(i) Decompression
(ii) Turbocharger malfunction
(iii) In-flight fire
(iv) Flight into severe turbulence or thunderstorms

b. Flight Training

(1) Preflight Briefing

(2) Preflight Planning

(i) Weather briefing and considerations
(ii) Course plotting
(iii) Airplane flight Manual review
(iv) Flight plan

(3) Preflight Inspection

(4) Runup, Takeoff, and Initial Climb

(5) Climb to High Altitude and Normal Cruise Operations While Operating Above 25,000 Feet MSL

(6) Emergencies

(i) Simulated rapid decompression
(ii) Emergency descent

(7) Planned Descents

(8) Shutdown Procedures

(9) Postflight Discussion

5. GROUND TRAINING

Thorough ground training should cover all aspects of high–altitude flight, including the flight environment, weather, flight planning and navigation, physiological aspects of high-altitude flight, systems and equipment, aerodynamics and performance, and high–altitude emergencies. The ground training should include the history and causes of past accidents and incidents involving the topics included in the MACH flight section. Accident reports are available from the NTSB and some aviation organizations.

6. THE HIGH-ALTITUDE FLIGHT ENVIRONMENT

For the purposes of CFR § 61.31(f), flight operations conducted above 25,000 feet are considered to be high altitude. However, the high-altitude environment itself begins below 25,000 feet. For example, flight levels (FL) are used at and above 18,000 feet (e.g., FL 180) to indicate levels of constant atmospheric pressure in relation to a **reference datum of 29.92" Hg**. Certain airspace designations and Federal Aviation Administration (FAA) requirements become effective at different altitudes. Pilots must be familiar with these elements before operating in each realm of flight.

a. Airspace. In order for pilots to operate in the National Airspace System they must know the various airspace segments and classifications, as well as their associated operational requirements. Furthermore, they also need to be aware of any special flight restrictions or aircraft equipment requirements that apply.

b. Title 14 of the Code of Federal Regulations (CFR). In addition to the training required by CFR § 61.31(f), pilots of high-altitude aircraft should be familiar with CFR Part 91 regulations that apply specifically to flight at high altitudes.

(1) CFR § 91.215 requires that all aircraft operating within the continental United States at and above 10,000 feet MSL be equipped with an operable transponder with Mode C capability (unless operating at or below 2,500 feet above ground level (AGL), below the PCA).

(2) CFR § 91.211 (a) requires that the minimum flightcrew on civil aircraft of U.S. registry be provided with and use **supplemental oxygen** at cabin pressure altitudes above 12,500 feet MSL up to and including 14,000 feet MSL for that portion of the flight that is at those altitudes for more than 30 minutes. The required minimum flightcrew must be provided with and use supplemental oxygen at all times when operating an aircraft above 14,000 feet MSL. At cabin pressure altitudes above 15,000 feet MSL, all occupants of the aircraft must be provided with supplemental oxygen.

(3) CFR § 91.211 (b) requires pressurized aircraft to have at least a 10-minute additional supply of supplemental oxygen for each occupant at flight altitudes above FL 250 in the event of a **decompression**. At flight altitudes above FL 350, one pilot at the controls of the airplane must wear and use an oxygen mask that is secured and sealed. The oxygen mask must supply oxygen at all times or must automatically supply oxygen when the cabin pressure altitude of the airplane exceeds 14,000 feet MSL. An exception to this regulation exists for two-pilot crews that operate at or below FL 410. One pilot does not need to wear and use an oxygen mask if both pilots are at the controls and each pilot has a quick donning type of oxygen mask that can be placed on the face with one hand from the ready position and be properly secured, sealed, and operational within 5 seconds. If one pilot of a two-pilot crew is away from the controls, then the pilot that is at the controls must wear and use an oxygen mask that is secured and sealed.

(4) CFR § 91.121 requires that aircraft use an altimeter setting of 29.92 at all times when operating at or above FL 180.

(5) CFR § 91.135 requires that all flights within Class A airspace be conducted under instrument flight rules (IFR) in an aircraft equipped for IFR and flown by a pilot who is rated for instrument flight.

(6) CFR § 91.159 and § 91.179 specify cruising altitudes and flight levels for visual flight rules (VFR) and IFR flights, respectively. When operating VFR above 18,000 feet MSL to flight level 290 (inclusive), and on a magnetic course of zero degrees through 179 degrees, any odd flight level + 500 feet (such as 195, 215 or 235); or on a magnetic course of 180 degrees through 359 degrees, any even flight level + 500 feet (such as 185, 205, or 225). When operating VFR above flight level 290 and on a magnetic course of zero degrees through 179 degrees, any flight level, at 4,000-foot intervals, beginning at and including flight level 300 (such as flight level 300, 340, or 380); or on a magnetic course of 180 degrees through 359 degrees, any flight level at 4,000-foot intervals, beginning at and including flight level 320 (such as flight level 320, 360, or 400).

When operating IFR at or above 18,000 feet MSL but below flight level 290, and on a magnetic course of zero degrees through 179 degrees, any odd flight level (such as 190, 210, or 230); or

on a magnetic course of 180 degrees through 359 degrees, any even flight level (such as 180, 200, or 220). When operating IFR at flight level 290 and above, and on a magnetic course of zero degrees through 179 degrees, any flight level, at 4,000-foot intervals, beginning at and including flight level 290 (such as flight level 290, 330, or 370); or on a magnetic course of 180 degrees through 359 degrees, any flight level, at 4,000-foot intervals, beginning at and including flight level 310 (such as flight level 310, 350, or 390).

7. WEATHER

Pilots should be aware of and recognize the meteorological phenomena associated with high altitudes and the effects of these phenomena on flight.

a. **The Atmosphere.** The atmosphere is a mixture of gases in constant motion. It is composed of approximately 78 percent nitrogen, 21 percent oxygen, and 1 percent other gases. Water vapor is constantly being absorbed and released in the atmosphere which causes changes in weather. The three levels of the atmosphere where high-altitude flight may occur are the troposphere, which can extend from sea level to approximately FL 350 around the poles and up to FL 650 around the equator; the tropopause, a thin layer at the top of the troposphere that traps water vapor in the lower level; and the stratosphere, which extends from the tropopause to approximately 22 miles. The stratosphere is characterized by lack of moisture and a constant temperature of -55° C, while the temperature in the troposphere decreases at a rate of 2° C per 1,000 feet. Condensation trails, or contrails, are common in the upper levels of the troposphere and in the stratosphere. These cloud-like streamers that are generated in the wake of aircraft flying in clear, cold, humid air, form by water vapor from aircraft exhaust gases being added to the atmosphere causing saturation or supersaturation of the air. Contrails can also form aerodynamically by the pressure reduction around airfoils, engine nacelles, and propellers cooling the air to saturation.

b. **Atmospheric density** in the troposphere decreases 50 percent at 18,000 feet. This means that at FL 180, the air contains only one-half the oxygen molecules as at sea level. Because the human body requires a certain amount of oxygen for survival, aircraft that fly at high altitudes must be equipped with some means of creating an artificial atmosphere, such as **cabin pressurization**.

c. **Winds.**

(1) The jet stream is a narrow band of high-altitude winds, near or in the tropopause, that results from large temperature contrasts over a short distance (typically along fronts) creating large pressure gradients aloft. The jet stream usually travels in an easterly direction between 50 and 200K. The speed of the jet stream is greater in the winter than in the summer months because of greater temperature differences. It generally drops more rapidly on the polar side than on the equatorial side. In the mid-latitudes, the polar front jet stream is found in association with the polar front. This jet stream has a variable path, sometimes flowing almost due north and south.

(2) Because of its meandering path, the polar front jet stream is not found on most circulation charts. One almost permanent jet is a westerly jet found over the subtropics at 25° latitude about 8 miles above the surface. Low pressure systems usually form to the south of the jet stream and move northward until they become occluded lows which move north of the jet stream. Horizontal windshear and turbulence are frequently found on the northern side of the jet stream.

d. **Clear Air Turbulence (CAT).** CAT is a meteorological phenomenon associated with high-altitude winds. This high-level turbulence occurs where no clouds are present and can take place at any altitude (normally above 15,000 feet AGL), although it usually develops in or near the jet stream where there is a rapid change in temperature. CAT is generally stronger on the polar side of the jet and is greatest during the winter months. CAT can be caused by wind-shear, convective currents, mountain waves, strong low pressures aloft, or other obstructions to normal wind flow. CAT is difficult to forecast because it gives no visual warning of its presence and winds can carry it far from its point of origin.

e. **Clouds and Thunderstorms.**

(1) Cirrus and cirriform clouds are high-altitude clouds that are composed of ice crystals. Cirrus clouds are found in stable air above 30,000 feet in patches or narrow bands Cirriform clouds, such as the white clouds in long bands against a blue background known as cirrostratus clouds, generally indicate some type of system below. Cirrostratus clouds

form in stable air as a result of shallow convective currents and also may produce light turbulence. Clouds with extensive vertical development (e.g., towering cumulus and cumulonimbus clouds) indicate a deep layer of unstable air and contain moderate to heavy turbulence with icing. The bases of these clouds are found at altitudes associated with low to middle clouds but their tops can extend up to 60,000 feet or more.

(2) Cumulonimbus clouds are thunderstorm clouds that present a particularly severe hazard to pilots and should be circumnavigated if possible. Hazards associated with cumulonimbus clouds include embedded thunderstorms, severe or extreme turbulence, lightning, icing, and dangerously strong winds and updrafts.

f. **Icing.** Icing at high altitudes is not as common or extreme as it can be at low altitudes. When it does occur, the rate of accumulation at high altitudes is generally slower than at low altitudes. Rime ice is generally more common at high altitudes than clear ice, although clear ice is possible. Despite the composition of cirrus clouds, severe icing is generally not a problem although it can occur in some detached cirrus. It is more common in tops of tall cumulus buildups, anvils, and over mountainous regions. Many airplanes that operate above 25,000 feet are equipped with deice or anti-ice systems, reducing even further the dangers of icing.

8. FLIGHT PLANNING AND NAVIGATION

a. **Flight Planning.**

(1) Careful flight planning is critical to safe high-altitude flight. Consideration must be given to power settings, particularly on takeoff, climb, and descent to assure operation in accordance with the manufacturer's recommendations. Fuel management, reporting points, weather briefings (not only thunderstorms, the freezing level, and icing at altitude but at all levels and destinations, including alternates, that may affect the flight), direction of flight, airplane performance charts, high speed winds aloft, and oxygen duration charts must also be considered. When possible, additional oxygen should be provided to allow for emergency situations. Breathing rates increase under stress and extra oxygen could be necessary.

(2) Flight planning should take into consideration factors associated with altitudes that will be transited while climbing to or descending from the high altitudes (e.g., airspeed limitations below 10,000 feet MSL, airspace, and minimum altitudes). Westward flights should generally be made away from the jet stream to avoid the strong headwind, and eastward flights should be made in the jet stream when possible to increase groundspeed. Groundspeed checks are particularly important in high-altitude flight. If fuel runs low because of headwinds or poor flight planning, a decision to fly to an alternate airport should be made as early as possible to allow time to replan descents and advise ATC.

b. **Knowledge of Aircraft.** Complete familiarity with the aircraft systems and limitations is extremely important. For example, many high-altitude airplanes feed from only one fuel tank at a time. If this is the case, it is important to know the fuel consumption rate in order to know when to change tanks. This knowledge should be made part of the preflight planning and its accuracy confirmed regularly during the flight.

c. **Gradual Descents.** Gradual descents from high altitudes should be planned in advance to prevent excessive engine cooling and provide passenger comfort. The manufacturer's recommendations found in the Airplane Flight Manual should be complied with, especially regarding descent power settings to avoid stress on the engines. Although most jets can descend rapidly at idle power, many turboprop and light twin airplanes require some power to avoid excessive engine cooling, cold shock, and metal fatigue. ATC does not always take aircraft type into consideration when issuing descent instructions. **It is the pilot's responsibility to fly the airplane in the safest manner possible,** Cabin rates of descent are particularly important and should generally not exceed 500 or 600 feet per minute. Before landing, cabin pressure should be equal to ambient pressure or inner ear injury can result. If delays occur en route, descents should be adjusted accordingly.

d. **Weather Charts.** Before beginning a high-altitude flight, all weather charts should be consulted, including those designed for low levels. Although high-altitude flight may allow a pilot to overfly adverse weather, low altitudes must be transited on arrival, departure, and in an emergency situation that may require landing at any point en route.

e. **Types of Weather Charts.** Weather charts that provide information on high-altitude weather include Constant Pressure Charts, which provide information on pressure systems, temperature, winds, and temperature/dewpoint spread at the 850 millibar (mb), 700 mb, 500 mb, 300 mb, and 200 mb levels (5 charts are issued every 12 hours). Prognostic Charts forecast winds, temperature, and expected movement of weather over the 6-hour valid time of the chart. Observed Tropopause Charts provide jet stream, turbulence, and temperature wind-pressure reportings at the tropopause over each station. Tropopause Wind Prognostic Charts and Tropopause Height Vertical Windshear Charts are helpful in determining jet stream patterns and the presence of CAT and windshear.

f. **Windshear.** Windshear is indicated by dashed lines on Tropopause Height Vertical Windshear Charts. Horizontal wind changes of 40 K within 150 NM, or vertical windshear of 6 K or greater per 1,000 feet usually indicate moderate to severe turbulence and should be avoided. Pilot report (PIREPs) are one of the best methods of receiving timely and accurate reports on icing and turbulence at high altitudes.

g. **Navigation.** Specific charts have been designed for flight at FL 180 and above. Enroute high-altitude charts delineate the jet route system, which consists of routes established from FL 180 up to and including FL 450. The VOR airways established below FL 180 found on low-altitude charts must not be used at FL 180 and above. High-altitude jet routes are an independent matrix of airways, and pilots must have the appropriate enroute high-altitude charts before transitioning to the flight levels.

h. **Jet Routes.** Jet routes in the U.S. are predicated solely on VOR or VORTAC navigation facilities, except in Alaska where some are based on L/MF navigation aids. All jet routes are identified by the letter "J" and followed by the airway number.

i. **Reporting Points.** Reporting points are designated for jet route systems and must be used by flights using the jet route unless otherwise advised by ATC. Flights above FL 450 may be conducted on a point-to-point basis, using the facilities depicted on the enroute high-altitude chart as navigational guidance. Random and fixed Area Navigation (RNAV) Routes are also used for direct navigation at high altitudes and are based on area navigation capability between waypoints defined in terms of latitude/longitude coordinates, degree-distance fixes, or offsets from established routes or airways at a specified distance and direction. Radar monitoring by ATC is required on all random RNAV routes.

j. **Point-to-Point Navigation.** In addition to RNAV, many high-altitude airplanes are equipped with point-to-point navigation systems for high-altitude en route flight. These include LORAN-C, OMEGA, Inertial Navigation System, and Doppler Radar. Further information about these and additional navigation systems are available in the Aeronautical Information Manual (AIM).

k. **Navaids.** VOR, DME, and TACAN depicted on high-altitude charts are designated as class H navaids, signifying that their standard service volume is from 1,000 feet AGL up to and including 14,500 AGL at radial distances out to 40 NM; from 14,500 feet AGL up to and including 60,000 feet AGL at radial distances out to 100 NM; and from 18,000 feet AGL up to and including 45,000 feet AGL at radial distances out to 130 NM. Ranges of NDB service volumes are the same at all altitudes.

9. PHYSIOLOGICAL TRAINING

To ensure safe flights at high altitudes, pilots of high-altitude aircraft must understand the physiological effects of high-altitude flight. Additional physiological training information, including locations and application procedures for attending an altitude chamber, can be found in the MACH-flight section. Although not required, altitude chamber training is highly recommended for all pilots.

a. **Respiration** is the exchange of gases between the organism and its environment. In humans, external respiration is the intake of oxygen from the atmosphere by the lungs and the elimination of some carbon dioxide from the body into the surrounding atmosphere. Each breath intake is comprised of approximately 21 percent oxygen which is absorbed into the bloodstream and carried by the blood throughout the body to burn food material and to produce heat and kinetic energy. The partial pressure of oxygen forces oxygen through air sacs (alveoli), located at the end of each of the smaller tubes that branches out from the bronchial tubes and lungs, into the bloodstream. Other gases contained in the lungs reduce the partial pressure of oxygen entering the air sacs to about 102

mm Hg at ground level, which is approximately 21 percent of the total atmospheric pressure.

b. **The human body** functions normally in the atmospheric area extending from sea level 12,000 feet MSL. In this range, brain oxygen saturation is at a level that allows for normal functioning. (Optimal functioning is 96 percent saturation. At 12,000 feet, brain oxygen saturation is approximately 87 percent which begins to approach a level that could affect human performance. Although oxygen is not required below 12,500 feet MSL, its use is recommended when flying above 10,000 feet MSL during the day and above 5,000 feet MSL at night when the eyes become more sensitive to oxygen deprivation.)

c. **Although minor physiological problems,** such as middle ear and sinus trapped gas difficulties, can occur when flying below 12,000 feet, shortness of breath, dizziness, and headaches will result when an individual ascends to an altitude higher than that to which his or her body is acclimated. From 12,000 to 50,000 feet MSL, atmospheric pressure drops by 396 mm Hg. This area contains less partial pressure of oxygen which can result in problems such as trapped or evolved gases within the body. **Flight at and above 50,000 feet MSL requires sealed cabins or pressure suits.**

d **Hypoxia** is a lack of sufficient oxygen in the body cells or tissues caused by an inadequate supply of oxygen, inadequate transportation of oxygen, or inability of the body tissues to use oxygen. **A common misconception among many pilots who are inexperienced in high-altitude flight operations and who have not been exposed to physiological training is that it is possible to recognize the symptoms of hypoxia and to take corrective action before becoming seriously impaired.**. While this concept may be appealing in theory, it is both misleading and dangerous for an untrained crewmember. Symptoms of hypoxia vary from pilot to pilot, but one of the earliest effects of hypoxia is impairment of judgment. Other symptoms can include one or more of the following:

(1) **Behavioral changes** (e.g., a sense of euphoria)

(2) **Poor coordination**

(3) **Discoloration** at the fingernail beds (cyanosis)

(4) **Sweating**

(5) **Increased breathing rate,** headache, sleepiness, or fatigue

(6) **Loss or deterioration of vision**

(7) **Light-headedness** or dizzy sensations and listlessness

(8) **Tingling or warm sensations**

e. While other significant effects of hypoxia usually do not occur in a healthy pilot in an unpressurized aircraft below 12,000 feet, there is no assurance that this will always be the case. The onset of hypoxic symptoms may seriously affect the safety of flight and may well occur even in short periods of exposure to altitudes from 12,000 to 15.000 feet. The ability to take corrective measures may be totally lost in 5 minutes at 22,000 feet. However, that time would be reduced to only 18 seconds at 40,000 feet and the crewmember may suffer total loss of consciousness soon thereafter. A description of the four major hypoxia groups and the recommended methods to combat each follows.

(1) **Hypoxic (Altitude) Hypoxia.** Altitude hypoxia poses the greatest potential physiological hazard to a flight crewmember while flying in the high-altitude environment. This type of hypoxia is caused by an insufficient partial pressure of oxygen in the inhaled air resulting from reduced oxygen pressure in the atmosphere at altitude. If a person is able to recognize the onset of hypoxic symptoms, immediate use of supplemental oxygen will combat hypoxic hypoxia within seconds. Oxygen systems should be checked periodically to ensure that there is an adequate supply of oxygen and that the system is functioning properly. This check should be performed frequently with increasing altitude. If supplemental oxygen is not available, an emergency descent to an altitude below 10,000 feet should be initiated.

(2) **Histotoxic Hypoxia.** This is the inability of the body cells to use oxygen because of impaired cellular respiration. This type of hypoxia, caused by alcohol or drug use, cannot be corrected by using supplemental oxygen because the uptake of oxygen is impaired at the tissue level. The only method of avoiding this type of hypoxia is to abstain, before flight, from alcohol or drugs that are not approved by

a flight surgeon or an aviation medical examiner.

(3) **Hypemic (Anemic) Hypoxia.** This type of hypoxia is defined as a reduction in the oxygen-carrying capacity of the blood. Hypemic hypoxia is caused by a reduction in circulating red blood cells (hemoglobin) or contamination of blood with gases other than oxygen as a result of anemia, carbon monoxide poisoning, or excessive smoking. Pilots should take into consideration the effect of smoking on altitude tolerance when determining appropriate cabin pressures. If heavy smokers are among the crew or passengers, a lower cabin altitude should be set because apparent altitudes for smokers are generally much higher than actual altitudes. For example, a smoker's apparent altitude at sea level is approximately 7,000 feet. Twenty thousand feet actual altitude for a nonsmoker would be equivalent to an apparent altitude of 22,000-feet for a smoker. The smoker is thus more susceptible to hypoxia at lower altitudes than the nonsmoker. Hypemic hypoxia is corrected by locating and eliminating the source of the contaminating gases. A careful preflight of heating systems and exhaust manifold equipment is mandatory. Also, cutting down on smoking would minimize the onset of this type of hypoxia. If symptoms are recognized, initiate use of supplemental oxygen and/or descend to an altitude below 10,000 feet. If symptoms persist, ventilate the cabin and land as soon as possible because the symptoms may be indicative of carbon monoxide poisoning and medical attention should be sought.

(4) **Stagnant Hypoxia.** This is an oxygen deficiency in the body resulting from poor circulation of the blood because of a failure of the circulatory system to pump blood (and oxygen) to the tissues Evidence of coronary artery disease is grounds for immediate denial or revocation of a medical certificate. In flight, this type of hypoxia can sometimes be caused by positive pressure breathing for long periods of time or excessive G-forces.

f. **Effective Performance Time (EPT) or Time of Useful Consciousness (TUC)** is the amount of time in which a person is able to effectively or adequately perform night duties with an insufficient supply of oxygen. EPT decreases with altitude, until eventually coinciding with the time it takes for blood to circulate from the lungs to the head usually at an altitude above 35,000 feet. Table 1 shows the TUC (shown as average TUC) at various altitudes.

g. **Other factors that determine EPT** are the rate of ascent (faster rates of ascent result in shorter EPT's), physical activities (exercise decreases EPT's), and day-to-day factors such as physical fitness, diet, res, prescription drugs, smoking, and illness. Altitude chamber experiments found a significantly longer TUC for nonsmoker pilots who exercise and watch their diet than for pilots who smoke and are not physically fit.

Table 1. Times Of Useful Consciousness (TUC) At Various Altitudes

Altitude (Feet)	Sitting Quietly	Moderate Activity
22,000	10 minutes	5 minutes
25,000	05 minutes	3 minutes
30,000	01 minute	45 seconds
35,000	45 seconds	30 seconds
40,000	25 seconds	18 seconds

h. **Prolonged oxygen use** can also be harmful to human health. One hundred percent aviation oxygen can produce toxic symptoms if used for extended periods of time. The symptoms can consist of bronchial cough, fever, vomiting, nervousness, irregular heart beat, and lowered energy. These symptoms appeared on the second day of breathing 90 percent oxygen during controlled experiments. It is unlikely that oxygen would be used long enough to produce the most severe of these symptoms in any aviation incidence. However, prolonged flights at high altitudes using a high concentration of oxygen can produce some symptoms of oxygen poisoning such as infection or bronchial irritation. The sudden supply of pure oxygen following a decompression can often aggravate the symptoms of hypoxia. Therefore, oxygen should be taken gradually, particularly when the body is already suffering from lack of oxygen, to build up the supply in small doses. If symptoms of oxygen poisoning develop, high concentrations of oxygen should be avoided until the symptoms completely disappear.

i. **When nitrogen is inhaled,** it dilutes the air we breathe. While most nitrogen is exhaled from the lungs along with carbon dioxide, some nitrogen is absorbed by the body. The nitrogen absorbed into the body tissues does not normally present any problem because it is carried in a liquid state. If the ambient surrounding atmospheric pressure lowers drastically, this nitrogen could change from a liquid and return to its gaseous state in the form of bubbles. These evolving and expanding gases in the body are known as

decompression sickness and are divided into two groups

(1) **Trapped Gas.** Expanding or contracting gas in certain body cavities during altitude changes can result in abdominal pain, toothache, or pain in ears and sinuses if the person is unable to equalize the pressure changes. Above 25,000 feet, distention can produce particularly severe gastrointestinal pain.

(2) **Evolved Gas.** When the pressure on the body drops sufficiently, nitrogen comes out of solution and forms bubbles which can have adverse effects on some body tissues. Fatty tissue contains more nitrogen than other tissue; thus making overweight people more susceptible to evolved gas decompression sicknesses.

(i) **SCUBA** diving will compound this problem because of the compressed air used in the breathing tanks. After SCUBA diving, a person who flies in an aircraft to an altitude of 8,000 feet would experience the same effects as a nondiver flying at 40,000 feet unpressurized. The recommended waiting period before going to flight altitudes of 8,000 feet is at least 12 hours after nondecompression stop diving (diving which does not require a controlled ascent), and 24 hours after decompression stop diving (diving which requires a controlled ascent). For flight altitudes above 8,000 feet, the recommended waiting time is at least 24 hours after any SCUBA diving.

(ii) **The bends,** also known as **caisson disease,** is one type of evolved gas decompression sickness and is characterized by pain in and around the joints. The term bends is used because the resultant pain is eased by bending the joints. The pain gradually becomes more severe, can eventually become temporarily incapacitating and can result in collapse. The **chokes** refers to a decompression sickness that manifests itself through chest pains and burning sensations, a desire to cough, possible **cyanosis,** a sensation of suffocation, progressively shallower breathing and, if a descent is not made immediately, collapse and unconsciousness. **Paresthesia** is a third type of decompression sickness, characterized by tingling, itching, a red rash, and cold and warm sensations, probably resulting from bubbles in the **central nervous system (CNS).** CNS disturbances can result in visual deficiencies such as illusionary lines or spots, or a blurred field of vision. Some other effects of CNS disturbances are temporary partial paralysis, sensory disorders, slurred speech, and seizures.

j. **Shock** can often result from decompression sicknesses as a form of body protest to disrupted circulation. Shock can cause nausea, fainting, dizziness, sweating, and/or loss of consciousness. The best treatment for decompression sickness is descent to a lower altitude and landing. If conditions persist after landing, recompression chambers can be located through an aviation medical examiner.

k. **Vision** has a tendency to deteriorate with altitude. A reversal of light distribution at high altitudes (bright clouds below the airplane and darker, blue sky above) can cause a glare inside the cockpit. Glare effects and deteriorated vision are enhanced at night when the body becomes more susceptible to hypoxia. **Night vision** can begin to deteriorate at cabin pressure altitudes as low as 5,000 feet. In addition, the empty visual field caused by cloudless, blue skies during the day can cause inaccuracies when judging the speed, size, and distance of other aircraft. Sunglasses are recommended to minimize the intensity of the sun's ultraviolet rays at high altitudes.

10. ADDITIONAL PHYSIOLOGICAL TRAINING

There are no specific requirements in CFR Part 91 or Part 125 for physiological training. However, in addition to the high altitude training required by CFR § 61.31(f), which should include the physiological training outlined in this chapter, CFR Parts 121 and 135 require flight crewmembers that serve in operations above 25,000 feet to receive training in specified subjects of aviation physiology. None of the requirements includes altitude chamber training. The U.S. military services require its flight crewmembers to complete both initial and refresher physiologic training, including instruction in basic aviation physiology and altitude chamber training. Other U.S. government agencies, such as the National Aviation and Space Administration and FAA, also require their flight personnel who operate pressurized aircraft in the high-altitude flight environment to complete similar training. Although most of the subject material normally covered in physiological training concerns problems associated with reduced atmospheric pressure at high-flight altitudes, other equally important subjects are covered as well. Such subjects of aviation physiology as vision, disorientation, physical fitness, stress, and survival affect fight safety and are normally presented in a good training program.

a. **Physiological training** programs are offered at locations across the United States (Table 2) for pilots who are interested in learning to recognize and overcome vertigo, hypoxia, hyperventilation, etc., during flight. Trainees who attend these programs will be given classroom lec-

tures, a high-altitude "flight" in an altitude chamber, and time in a jet aircraft cockpit spatial disorientation training device at some of the military bases that offer the course.

b. **Persons who wish to take this training** must be at least 18 years of age, hold a current FAA Airman Medical Certificate, and must not have a cold or any other significant health problem when enrolling for the course.

c. **Applications for physiological training** may be obtained at any FAA Flight Standards District Office. Persons who wish to enroll should send a completed application and payment (minimal fee for the course is $20) to the Mike Monroney Aeronautical Center, General Accounting Branch, AAC-23B, Box 25082. Oklahoma City, Oklahoma 73125.

d. **Within 30 to 60 days,** the applicant will be notified of the time and place of training.

Aeronautical Center, OK	Fairchild AFB, WA	Peterson AFB, CO
Andrews AFB, MD	Jacksonville NAS, FL	Point Mugu NMC, CA
Barbers Point NAS, HI	Laughlin AFB, TX	Reese AFB, TX
Beale AFB, TX	Lemoore NAS, CA	San Diego NAS, CA
Brooks AFB, TX	Little Rock AFB, AR	Sheppard AFB, TX
Brunswick NAS, ME	MacDill AFB, CA	Vance AFB, OK
Cherry Point MCAS, NC	Mather AFB, CA	Whidbey Island NAS, WA
Columbus AFB, MS	NASA Space Center, TX	Williams AFB, AZ
Edwards AFB, CA	Norfolk NAS, VA	Wright AFB, AZ
Ellsworth AFB, CA	Patuxent River NAS, MD	Wright-Patterson AFB, OH
El Toro MCAS, CA	Pease AFB, NH	

Table 2. List of Training Locations

11. HIGH-ALTITUDE SYSTEMS AND EQUIPMENT

Several systems and equipment are unique to aircraft that fly at high altitudes, and pilots should be familiar with their operation before using them. **Before any flight, a pilot should be familiar with all the systems on the aircraft to be flown.**

a. **Turbochargers.** Most light piston engine airplanes that fly above 25,000 feet MSL are turbocharged. Turbochargers compress air in the carburetor or cylinder intake by using exhaust gases from an engine-driven turbine wheel. The increased air density provides greater power and improved performance. Light aircraft use one of two types of turbocharging systems. The first is the normalizer system, which allows the engine to develop sea level pressure from approximately 29 inches of manifold pressure up to a critical altitude (generally between 14,000–16,000 feet MSL). The supercharger system is a more powerful system which allows the engine to develop higher than sea level pressure (up to 60 inches of manifold pressure) up to a critical altitude. To prevent overboosting at altitudes below the critical altitude, a waste gate is installed in the turbocompressor system to release unnecessary gases. The waste gate is a damper-like device that controls the amount of exhaust that strikes the turbine rotor. As the waste gate closes with altitude, it sends more gases through the turbine compressor, causing the rotor to spin faster. This allows the engine to function as if it were maintaining sea level or, in the case of a supercharger, above sea level manifold pressure. The three principle types of waste gate operations are manual, fixed, and automatic

(1) **Manual Waste Gate.** Manual waste gate systems are common in older aircraft but have been discontinued due to the additional burden on the pilot. Waste gates were often left closed on takeoff or open on landing, resulting in an overboost that could harm the engine.

(2) **Fixed Waste Gate.** Fixed waste gates pose less of a burden on the pilot, but the pilot must still be careful not to overboost the engine, especially on takeoff, initial climb, and on cold days when the air is especially dense. This type of waste gate remains in the same position during all engine operations, but it splits the exhaust flow allowing only partial

exhaust access to the turbine. The pilot simply controls manifold pressure with smooth, slow application of the throttle to control against overboost. If overboost does occur, a relief valve on the intake manifold protects the engine from damage. This is not a favorable system due to fluctuations in manifold pressure and limited additional power from the restricted control over the exhaust flow. In addition, the compressor can produce excessive pressure and cause overheating.

(3) **Automatic Waste Gate.** Automatic waste gates operate on internal pressure When internal pressure builds towards an overboost, the waste gate opens to relieve pressure, keeping the engine within normal operating limits regardless of the air density.

(i) The pressure-reference automatic waste gate system maintains the manifold pressure set by the throttle. Engine oil pressure moves the waste gate to maintain the appropriate manifold pressure, thus reducing the pilot's workload and eliminating the possibility of overboost. If the airplane engine is started up and followed by an immediate takeoff, cold oil may cause a higher than intended manifold pressure. Allow the oil to warm up and circulate throughout the system before takeoff.

(ii) The density-reference waste gate system is controlled by compressor discharge air. A density controller holds a given density of air by automatically adjusting manifold pressure as airspeed, ambient pressure, temperature, altitude, and other variables change.

b. **Turbocharged engines** are particularly temperature sensitive. Manufacturers often recommend increasing the fuel flow during climbs to prevent overheating. It is also important to cool the engine after landing. Allowing the engine to idle for approximately 1 minute before shutting it down permits engine oil to flow through the system, cooling the engine while simultaneously cooling and lubricating the turbocharger.

c. **Most high-altitude airplanes** come equipped with some type of **fixed oxygen installation.** If the airplane does not have a fixed installation, portable oxygen equipment muse be readily accessible during flight. The portable equipment usually consists of a container, regulator, mask outlet, and pressure gauge. A typical 22 cubic-foot portable container will allow four people enough oxygen to last approximately 1.5 hours at 18,000 feet MSL. Aircraft oxygen is usually stored in high pressure system containers of 1,800–2,200 pounds per square inch (PSI). The container should be fastened securely in the aircraft before flight. When the ambient temperature surrounding an oxygen cylinder decreases, pressure within that cylinder will decrease because pressure varies directly with temperature if the volume of a gas remains constant. Therefore, if a drop in indicated pressure on a supplemental oxygen cylinder is noted, there is no reason to suspect depletion of the oxygen supply, which has simply been compacted due to storage of the containers in an unheated area of the aircraft. High pressure oxygen containers should be marked with the PSI tolerance (i.e., 1,800 PSI) before filling the container to that pressure. The containers should be supplied with aviation oxygen only, which is 100 percent pure oxygen. Industrial oxygen is not intended for breathing and may contain impurities, and medical oxygen contains water vapor that can freeze in the regulator when exposed to cold temperatures. To assure safety, oxygen system periodic inspection and servicing should be done at FAA certificated stations found at some fixed base operations and terminal complexes.

d. **Regulators and masks** work on continuous flow, diluter demand, or on pressure demand systems. The continuous flow system supplies oxygen at a rate that may either be controlled by the user or controlled automatically on some regulators. The mask is designed so the oxygen can be diluted with ambient air by allowing the user to exhale around the face piece, and comes with a rebreather bag which allows the individual to reuse part of the exhaled oxygen. The pilots' masks sometimes allow greater oxygen flow than passengers' masks, so it is important that the pilots use the masks that are indicated for them. Although certificated up to 41,000 feet, very careful attention to system capabilities is required when using continuous flow oxygen systems above 25,000 feet.

e. **Diluter demand and pressure demand** systems supply oxygen only when the user inhales through the mask. An automix lever allows the regulators to automatically mix cabin air and oxygen or supply 100 percent oxygen, depending on the altitude. The demand mask provides a tight seal over the face to prevent dilution with outside air and can be used safely up to 40,000 feet. Pilots who fly at those altitudes should not have beards and moustaches because air can easily seep in through the border of

the mask. Pressure demand regulators also create air-tight and oxygen-tight seals but they also provide a positive pressure application of oxygen to the mask face piece which allows the user's lungs to be pressurized with oxygen. This feature makes pressure demand regulators safe at altitudes above 40,000 feet.

f. **Pilots should be aware of the danger of fire when using oxygen.** Materials that are nearly fireproof in ordinary air may be susceptible to burning in oxygen. Oils and greases may catch fire if exposed to oxygen and, therefore, cannot be used for sealing the valves and fittings of oxygen equipment. Smoking during any kind of oxygen equipment use must also be strictly forbidden.

g. **Surplus oxygen equipment** must be inspected and approved by a certified FAA inspection station before being used. Before each flight, the pilot should thoroughly inspect and test all oxygen equipment. The inspection should be accomplished with clean hands and should include a visual inspection of the mask and tubing for tears, cracks, or deterioration; the regulator for valve and lever condition and positions; oxygen quantity; and the location and functioning of oxygen pressure gauges, flow indicators and connections. The mask should be donned and the system should be tested. After any oxygen use, verify that all components and valves are shut off.

h. **Cabin pressurization** is the compression of air in the aircraft cabin to maintain a cabin altitude lower than the actual flight altitude. Because of the ever-present possibility of decompression, supplemental oxygen is still required. Pressurized aircraft meeting specific requirements of CFR Part 23 or Part 25 have cabin altitude warning systems which are activated at 10,000 feet. Pressurized aircraft meeting the still more stringent requirements of CFR Part 25 have automatic passenger oxygen mask dispensing devices which activate before exceeding 15,000 feet cabin altitude.

i. **Pressurization** in most light aircraft is sent to the cabin from the turbocharger's compressor or from an engine-driven pneumatic pump. The flow of compressed air into the cabin is regulated by an outflow valve which keeps the pressure constant by releasing excess pressure into the atmosphere. The cabin altitude can be manually selected and is monitored by a gauge which indicates the pressure difference between the cabin and ambient altitudes. The rate of change between these two pressures is automatically controlled with a manual backup control.

j. **Each pressurized aircraft** has a determined **maximum pressure differential**, which is the maximum differential between cabin and ambient altitudes that the pressurized section of the aircraft can support. The pilot must be familiar with these limitations, as well as the manifold pressure settings recommended for various pressure differential. Some aircraft have a negative pressure relief valve to equalize pressure in the event of a sudden decompression or rapid descent to prevent the cabin pressure from becoming higher than the ambient pressure.

k. Reducing exposure to low barometric pressure lowers the occurrence of decompression sickness and the need for an oxygen mask is eliminated as a full time oxygen source above certain altitudes. Many airplanes are equipped with automatic visual and aural warning systems that indicate an unintentional loss of pressure.

l. **Technology** is continuously improving flight at high altitudes through the development of new devices and the improvement of existing systems. One such example is the **pressurized magneto.** Thin air at high altitudes makes the unpressurized magneto susceptible to crossfiring. The high tension pressurized system is composed of sealed caps and plugs that keep the electrodes contained within the body. A pressure line extends directly from the turbodischarger to the magneto. Pressurized magnetos perform better at high altitudes where low pressure and cold atmosphere have a detrimental effect on electrical conductivity. **Flight above 14,000 feet with an unpressurized magneto should be avoided because of its higher susceptibility to arcing.**

m. **Another airplane component recommended for flight at high altitudes** is the **dry vacuum pump.** Engine-driven wet vacuum pumps cannot create sufficient vacuum to drive the gyros in the low density found at high altitudes. Furthermore, gyros and rubber deicing boots can be ruined by oil contamination from the wet pump system, which uses engine oil for lubrication and cooling. Dry vacuum pumps are lightweight, self-lubricating systems that eliminate oil contamination and cooling problems. These pumps can power either a vacuum or pressure pneumatic system, allowing them to drive the gyros, deice boots, and pressurize the door seals.

12. AERODYNAMICS AND PERFORMANCE FACTORS

Thinner air at high altitudes has a significant impact on an airplane's flying characteristics because **surface control effects, lift, drag, and horsepower are all functions of air density.**

a. **The reduced weight of air** moving over control surfaces at high altitudes decreases their effectiveness. As the airplane approaches its absolute altitude, the controls become sluggish, making altitude and heading difficult to maintain. For this reason, most airplanes that fly at above 25,000 feet are equipped with an autopilot.

b. **A determined weight of air** is used by the engine for producing an identified amount of **horsepower** through internal combustion. For a given decrease of air density, **horsepower** decreases at a higher rate which is approximately 1.3 times that of the corresponding decrease in air density.

c. **For an airplane to maintain level flight,** drag and thrust must be equal. Because density is always greatest at sea level, the velocity at altitude given the same angle of attack will be greater than at sea level, although the **indicated air speed (IAS)** will not change. Therefore, an airplane's TAS increases with altitude while its IAS remains constant. In addition, an airplane's rate of climb will decrease with altitude.

13. EMERGENCIES AND IRREGULARITIES AT HIGH ALTITUDES

All emergency procedures in the Airplane Flight Manual (AFM) should be reviewed before flying any airplane, and that manual should be readily accessible during every flight. A description of some of the most significant high-altitude emergencies and remedial action for each follows.

a. **Decompression** is defined as the inability of the aircraft's pressurization system to maintain its designed pressure schedule. Decompression can be caused by a malfunction of the system itself or by structural damage to the aircraft. A decompression will often result in **cabin fog** because of the rapid drop in temperature and the change in relative humidity. A decompression will also affect the human body. Air will escape from the lungs through the nose and mouth because of a sudden lower pressure outside of the lungs. Differential air pressure on either side of the eardrum should clear automatically. Exposure to windblast and extremely cold temperatures are other hazards the human body may face with a decompression.

b. **Decompression** of a small cabin volume pressurized aircraft is more critical than a large one, given the same size hole or conditions, primarily because of the difference in cabin volumes. Table 3 is a comparison of cabin volume ratios between several large transport airplanes and some of the more popular general aviation turbojet airplanes in current use.

Aircraft Type	Cabin Volumes in Cubic Feet	Ratio
DC-9 vs CE-650	5,840 vs 576	10:1
B-737 vs LR-55	8,010 vs 502	16:1
B-727 vs NA-265	9,045 vs 430	21:1
L-1011 vs G-1159	35,000 vs 1,850	19:1
B-747 vs Learjet	59,000 vs 265	223: 1

Table 3. Aircraft Cabin Volume Ratios

Data Source: Physiological Considerations and Limitations in the High-altitude Operation of Small Volume Pressurized Aircraft. E. B. McFadden and D. de Steigner, Federal Aviation Administration (FAA) Civil Aeromedical Institute (CAMI).

Table 3 shows that, under the same conditions, a typical small pressurized aircraft can be expected to decompress on the order of 10 to 200 times as fast as a large aircraft. The B-747/Learjet comparison is an extreme example in that the human response TUC, and the protective equipment necessary are the same. Actual decompression times are difficult to calculate due to many variables involved (e.g., the type of failure, differential pressure, cabin volume, etc.). **However, it is more probable that the crew of the small aircraft will have less time in which to take life-saving actions.**

(1) **An explosive decompression** is a change in cabin pressure faster than the lungs can decompress. Most authorities consider any decompression which occurs in less than 0.5 seconds as explosive and potentially dangerous. This type of decompression is more likely to occur in small volume pressurized aircraft than in large pressurized aircraft and often results in lung damage. To avoid potentially dangerous flying debris in the event of an explosive decompression, all loose items such as baggage and oxygen cylinders should be properly secured.

(2) **A rapid decompression** is a change in cabin pressure where the lungs can decompress faster than the cabin. The risk of lung damage is significantly reduced in this decompression as compared with an explosive decompression.

(3) **Gradual or slow decompression is dangerous** because it may not be detected. Automatic visual and aural warning systems generally provide an indication of a slow decompression.

(4) **Recovery from all types of decompression** is similar. **Oxygen masks should be donned, and a rapid descent initiated as soon as possible to avoid the onset of hypoxia.** Although top priority in such a situation is reaching a safe altitude, pilots should be aware that cold-shock in piston engines can result from a high-altitude rapid descent, causing cracked cylinders or other engine damage. The time allowed to make a recovery to a safe altitude before loss of useful consciousness is, of course, much less with an explosive than with a gradual decompression.

c. **Increased oil temperature, decreased oil pressure, and a drop in manifold pressure** could indicate a **turbocharger malfunction** or a partial or complete turbocharger failure. The consequences of such a malfunction or failure are twofold. The airplane would not be capable of sustaining altitude without the additional power supplied by the turbocharging system. The loss in altitude in itself would not create a significant problem, weather and terrain permitting, but ATC must be notified of the descent. A more serious problem associated with a failed turbocharger would be loss of **cabin pressurization** if the pressurization system is dependent on the turbocharger compressor. Careful monitoring of pressurization levels is essential during the descent to avoid the onset of hypoxia from a slow decompression.

d. **Another potential problem associated with turbochargers is fuel vaporization.** Engine driven pumps that pull fuel into the intake manifold are susceptible to vapor lock at high altitudes. Most high-altitude aircraft are equipped with tank-mounted boost pumps to feed fuel to the engine-driven pump under positive pressure. These pumps should be turned on if fuel starvation occurs as a result of vapor lock.

e. **Because of the highly combustible composition of oxygen, an immediate descent to an altitude where oxygen is not required should be initiated if a fire breaks out during a flight at high altitude.** The procedures in the Airplane Flight Manual (AFM) should be closely adhered to.

f. **Flight through thunderstorm activity or known severe turbulence should be avoided,** if possible. When flight through severe turbulence is anticipated and/or unavoidable, the following procedures are highly recommended:

(1) **Airspeed is critical for any type of turbulent air penetration.** Use the Airplane Flight Manual recommended turbulence penetration target speed or, if unknown, an airspeed below maneuvering speed. Use of high airspeeds can result in structural damage and injury to passengers and crewmembers. Severe gusts may cause large and rapid variations in indicated airspeed. **Do not chase airspeed.**

(2) **Penetration** should be at an altitude that provides adequate maneuvering margins in case severe turbulence is encountered to avoid the **potential for catastrophic upset.**

(3) **If severe turbulence is penetrated** with the autopilot on, **the altitude hold mode should be off.** If the autopilot has an attitude hold mode, it should

be engaged. **The autopilot attitude hold mode can usually maintain attitude more successfully than a pilot under stress.** With the autopilot off, the yaw damper should be engaged. Controllability of the aircraft in turbulence becomes more difficult with the yaw damper off. Rudder controls should be centered before engaging the yaw damper.

(4) **When flight through a thunderstorm cannot be avoided,** turn up the intensity of panel and cabin lights so lightning does not cause temporary blindness. **White lighting in the cockpit is better than red lighting during thunderstorms.**

(5) **Keep wings level** and maintain the desired pitch attitude and approximate heading. Do not attempt to turn around and fly out of the storm because the speed associated with thunderstorms usually makes such attempts unsuccessful. Use smooth, moderate control movements to resist changes in attitude. If large attitude changes occur, avoid abrupt or large control inputs. Avoid, as much as possible, use of the stabilizer trim in controlling pitch attitudes. **Do not chase altitude.**

14. FLIGHT TRAINING

Flight training required to comply with CFR § 61.31(f) may be conducted in a high-altitude airplane or a simulator that meets the requirements of CFR § 121.407. The simulator should be representative of an airplane that has a service ceiling or maximum operating altitude, whichever is lower, above 25,000 feet MSL. **The training should consist of as many flights as necessary to cover the following procedures and maneuvers.** Each flight should consist of a preflight briefing, night planning, a preflight inspection (if an airplane is being used), demonstrations by the flight instructor of certain maneuvers or procedures when necessary and a postflight briefing and discussion.

a. **Preflight Briefing.** The flight instructor should verbally cover the material that will be introduced during the flight. If more than one flight is required, previous flights should be reviewed at this time. The preflight briefing is a good time to go over any questions the pilot trainee may have regarding operations at high altitudes or about the aircraft itself. **Questions by the trainee should be encouraged by the flight instructor during all portions of the flight training.**

b. **Preflight Planning. A thorough flight plan should be completed for a predetermined route.** The flight plan should include a complete weather briefing. If possible, a trip to a Fight Service Station (FSS) or National Weather Service (NWS) office is encouraged rather than a telephone briefing so the trainee can use actual weather charts. Winds, pilot reports, the freezing level and other meteorological information obtained from the briefing should be used to determine the best altitude for the flight. The information should be retained for future calculations.

(1) **The course should be plotted** on a high-altitude navigation chart noting the appropriate jet routes and required reporting points on a navigation log. Low-altitude charts should be available for planning departures and arrivals to comply with airspace and airspeed requirements. Alternate airports should also be identified and noted.

(2) **The Airplane Flight Manual (AFM) should be reviewed** with particular attention to weight and balance, performance charts, and emergency procedures. Oxygen requirements, airspeeds, groundspeeds, time en route, and fuel burn should be calculated using the Airplane Flight Manual and weather data, when applicable. Fuel management and descents should also be planned at this time. The Airplane Flight Manual should be readily accessible in the cabin in the event of an emergency.

(3) **A flight plan** should be completed using appropriate jet routes from the enroute high-altitude chart. The flight plan should be filed with the local FSS.

c. **Preflight Inspection.** The aircraft checklist should be followed carefully. Particular attention should be given to the aircraft's fuselage, windshields, window panels, and canopies to identify any cracks or damage that could rupture under the stress of cabin pressurization. The inspection should include a thorough examination of the aircraft oxygen equipment, including available supply, an operational check of the system, and assurance that the supplemental oxygen is in a readily accessible location.

d. **Runup, Takeoff and Initial Climb.** Procedures in the Airplane Flight Manual should be followed, particularly the manufacturer's recommended power settings and airspeeds to avoid overboosting the engine. **Standard call-out procedures are highly**

recommended and should be used for each phase of flight where the airplane crew consists of more than one crewmember.

e. **Climb to high altitude and normal cruise operations** while operating above 25,000 feet MSL. The transition from low to high altitude should be performed repeatedly to assure familiarity with appropriate procedures. Specific oxygen requirements should be met when climbing above 12,500 feet and pressurization should be adjusted with altitude. When passing through FL 180, the altimeter should be set to 29.92 and left untouched until descending below that altitude. Reporting points should be complied with, as should appropriate altitude selection for direction of flight. Throughout the entire climb and cruise above 25,000 feet, emphasis should be given to monitoring cabin pressurization.

f. **Simulated Emergencies.** Training should include at least one **simulated rapid decompression and emergency descent. Do not actually depressurize the airplane for this or any other training.** Actual decompression of an airplane can be **extremely dangerous** and should never be done intentionally for training purposes. The decompression should be simulated by donning the oxygen masks, turning on the supplemental oxygen controls, configuring the airplane for an emergency descent, and performing the emergency descent as soon as possible. This maneuver can be practiced at any altitude.

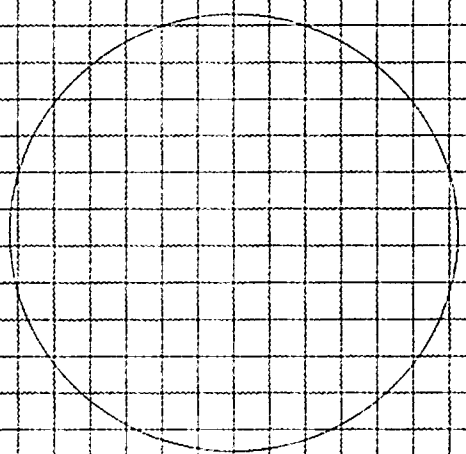
g. **Descents. Gradual descents from altitude should be practiced to provide passenger comfort** and compliance with procedures for transitioning out of the high-altitude realm of flight. The airplane manufacturer's recommendations should be followed with regard to descent power settings to avoid stress on the engine and excessive cooling. Particular emphasis should be given to cabin pressurization and procedures for equalizing cabin and ambient pressures before landing. Emphasis should also be given to changing to low-altitude charts when transitioning through FL 180, obtaining altimeter settings below FL 180, and complying with airspace and airspeed restrictions at appropriate altitudes.

h. **Engine Shutdown.** Allow the turbocharged engine to cool for at least 1 minute and assure that all shutdown procedures in the Airplane Flight Manual are followed. Before exiting the airplane, always check that all oxygen equipment has been turned off and that the valves on that equipment are closed.

i. **Postflight Discussion.** The instructor should review the flight and answer any questions the trainee may have. If additional flights are necessary to ensure thorough understanding of high-altitude operations, the material for the next flight should be previewed during the postflight discussion.

Ref.: AC 61-107, 1-23-91

Flight Notes



MACH-Flight • Pilot Training Outline

1. PURPOSE

This section presents a recommended outline for MACH-flight pilot training, and is designed to assist flight instructors in the presentation of pertinent factors relevant to the high-speed flight environment at high altitude to pilots transitioning into the high-speed realm of flight. The National Transportation Safety Board (NTSB) has determined that **it is the lack of understanding of many of these factors involving the laws of aerodynamics, performance, and MACH speeds that has produced a somewhat higher accident rate in some types of high-performance aircraft.**

2. CRITICAL ASPECTS OF MACH FLIGHT

In recent years, a number of corporate jet airplanes have been involved in catastrophic loss of control during high-altitude/high-speed flight. A significant causal factor in these accidents may well have been a lack of knowledge by the pilot regarding critical aspects of high-altitude MACH flight.

a. **Maximum operating altitudes of general aviation turbojet airplanes** have now reached 51,000 feet. It is, therefore, logical to expect these types of accidents to continue unless pilots learn to respect the more critical aspects of high-altitude/high-speed flight and gain as much knowledge as possible about the specific make and model of aircraft to be flown and its unique limitations.

b. **From the pilot's viewpoint,** MACH is the ratio of the aircraft's true airspeed to the local speed of sound. At sea level, on a **standard day** (59° F/15° C) the speed of sound equals approximately 660 K or 1,120 feet per second. MACH 0.75 at sea level is equivalent to a TAS of approximately 498 K (0.75 x 660 K) or 840 feet per second. The temperature of the atmosphere normally decreases with an increase in altitude. The speed of sound is directly related only to temperature. The result is a decrease in the speed of sound up to about 36,000 feet.

c. **The sleek design of some turbojet airplanes** has caused some operators to ignore critical airspeed and MACH limitations. There are known cases in which corporate turbojet airplanes have been modified by disabling the airspeed and MACH warning systems to permit intentional excursions beyond the FAA certificated Vmo/Mmo limit for the specific airplane. Such action may critically jeopardize the safety of the airplane by setting the stage for potentially hazardous occurrences.

d. **The compulsion to go faster may result in the onset of aerodynamic flutter,** which in itself can be disastrous, excessive G-loading in maneuvering, and induced flow separation over the ailerons and elevators. This may be closely followed by a loss of control surface authority and aileron buzz or snatch, coupled with yet another dangerous phenomenon called MACH-tuck, leading to catastrophic loss of the airplane and the persons onboard.

e. **MACH-tuck is caused principally by two basic factors:**

(1) **Shock wave-induced flow separation,** which normally begins near the wing root, causes a decrease in the downwash velocity over the elevator and produces a tendency for the aircraft to nose down.

(2) **Aftward movement of the center of pressure,** which tends to unbalance the equilibrium of the aircraft in relation to its center of gravity (CG) in subsonic flight.

f. **The airplane 's CG** is now farther ahead of the aircraft's aerodynamic center than it was in slower flight. This dramatically increases the tendency of the airplane to pitch more nosedown.

g **Pressure disturbances in the air,** caused by an airfoil in high-altitude/high-speed flight, result from molecular collisions. These molecular collisions are the result of air that moves over an airfoil faster than the air it is overtaking can dissipate. When the disturbance reaches a point at which its propagation achieves the local speed of sound, MACH 1 is attained. **One hundred percent (100%) of the speed of sound at MSL with a temperature of 15° C is 760 statute or 660 nautical miles per hour.** This speed is affected by temperature of the atmosphere at altitude. Thus, optimum thrust, fuel, and range considerations are significant factors in the design of most general aviation turbine-powered airplanes which cruise at some percentage of MACH 1.

h. **Because of the critical aspects of high-altitude/high-MACH flight,** most turbojet airplanes capable of operating in the MACH speed ranges are designed with some form of trim and autopilot MACH compensating device (stick puller) to alert the pilot to inadvertent excursions beyond its certificated Mno. This stick puller should never be disabled during normal flight operations in the aircraft.

i. **If for any reason there is a malfunction that requires disabling the stick puller,** the aircraft must be operated at speeds well below Mno as prescribed in the applicable Airplane Flight Manual (AFM) procedures for the aircraft.

j. **An airplane's IAS decreases in relation to TAS as altitude increases.** As the IAS decreases with altitude, it progressively merges with the low-speed buffet boundary where prestall buffet occurs for the airplane at a load factor of 1.0 G. The point where high speed MACH, IAS, and low-speed buffet boundary IAS merge is the airplane's absolute or aerodynamic ceiling. Once an aircraft has reached its aerodynamic ceiling, which is higher than the altitude limit stipulated in the AFM, the aircraft can neither be made to go faster without activating the design **stick puller** at MACH limit nor can it be made to go slower without activating the **stick shaker** or pusher. This critical area of the aircraft's flight envelope is known as **coffin corner.**

k. **MACH buffet occurs as a result of supersonic airflow on the wing.** Stall buffet occurs at angles of attack that produce airflow disturbances (burbling) over the upper surface of the wing which decreases lift. As density altitude increases, the angle of attack (AOA) that is required to produce an airflow disturbance over the top of the wing is reduced until a density altitude is reached where MACH buffet and stall buffet converge (described in introductory paragraph as **coffin corner**). When this phenomenon is encountered, serious consequences may result causing loss of control of the aircraft.

l. **Increasing either gross weight or load-factor (G-factor)** will increase the low speed buffet and decrease MACH buffet speeds. A typical turbojet airplane flying at 51,000 feet altitude at 1.0 G may encounter MACH buffet slightly above the airplane's Mno (0.82 MACH) and low speed buffet at 0.60 MACH. However, only 1.4 G (an increase of only 0.4 G) may bring on buffet at the optimum speed of 0.73 MACH and any change in airspeed, bank angle, or gust loading may reduce this straight and level flight 1.4 G protection to no protection. **Consequently, a maximum cruising flight altitude must be selected which will allow sufficient buffet margin for the maneuvering necessary and for gust conditions likely to be encountered.** Therefore, it is important for pilots to be familiar with the use of charts showing cruise maneuvering and buffet limits. Flightcrews operating airplanes at high speeds must be adequately trained to operate them safely. This training cannot be complete until pilots can demonstrate that they are thoroughly educated in the critical aspect of aerodynamic factors described herein pertinent to MACH flight at high altitudes.

3. AIRCRAFT AERODYNAMICS AND PERFORMANCE

Pilots who operate aircraft at high speeds and high altitudes are concerned with the forces affecting aircraft performance caused by the interaction of air on the aircraft. With an understanding of these forces, the pilot will have a sound basis for predicting how the aircraft will respond to control inputs. The importance of these aerodynamic forces and their direct application to performance and the execution of aircraft maneuvers and procedures, at altitude will be evident. The basic aerodynamics definitions that apply to high-altitude flight are contained in the previous section of this handbook.

a. Wing Design vs. Lifting Force.

(1) The wing of an airplane is an airfoil or aircraft surface designed to obtain the desired reaction from the air through which it moves. The profile of an aircraft wing is an excellent example of an efficient airfoil. The difference in curvature between the upper and lower surfaces of the wing generates a **lifting force.** Air passing over the upper wing surface moves at a higher velocity than the air passing beneath the wing because of the greater distance it must travel over the upper surface. This increased velocity results in a decrease in pressure on the upper surface. The pressure differential created between the upper and lower surfaces of the wing lifts the wing upward in the direction of the lowered pressure. This lifting force is known as **induced lift.** Induced lift may be increased, within limits, by:

(i) Increasing the angle of attack (AOA) of the wing or changing the shape of the airfoil, changing the geometry, e.g., aspect ratio

(ii) Increasing the wing area velocity

(iii) Increasing the free-stream

(iv) A change in air density

(2) The pilot may have only varying degrees of control over these factors. Thus, **the pilot must keep firmly in mind that an aircraft will obey the laws of physics just as precisely at its high-speed limits as it does during a slower routine flight**, and that regardless of wing shape or design, MACH range flight requires precise control of a high volume of potential energy without exceeding the critical MACH number or MACH crit.

(3) **MACH crit** is important to high speed aerodynamics because it is the speed at which the flow of air over a specific airfoil design reaches **MACH 1**, but the most important effect is formation of a shock wave and drag divergence.

(4) **Sweeping the wings of an airplane** is one method used by aircraft designers to delay the adverse effects of high MACH flight and bring about economical cruise with an increase in the critical MACH number. Sweep allows a faster airfoil speed before critical MACH is reached when compared to an equal straight wing. This occurs because the airflow now travels over a different cross section (camber) of the airfoil. This new cross section has less effective camber which results in a reduced acceleration of airflow over the wing, thus allowing a higher speed before critical MACH is reached. Sweep may be designed either forward or rearward; the overall effect is the same. However, rearward sweep appears to be somewhat more desirable, since it has presented fewer problems to manufacturers of models of general aviation aircraft in terms of unwanted design side effects. **In effect, the wing is flying slower than the airspeed indicator indicates and, similarly, it is developing less drag than the airspeed indicator would suggest.** Since less drag is being developed for a given indicated airspeed, less thrust is required to sustain the aircraft at cruise flight.

(5) There is a penalty, however, on the low-speed end of the spectrum. **Sweeping the wings** of an aircraft increases the landing stall speed which, in turn, means higher touchdown speed, with proportionally longer runway requirements and more tire and brake wear as opposed to a straight-wing design. A well-stabilized approach with precise control of **critical "V" speeds** is necessary. In other words, to achieve a safe margin airspeed on the wing that will not result in a stalled condition with the wingtips stalling prior to the rest of the wing and possibly rolling uncontrollably to the right or left, **the swept-wing aircraft must be flown at a higher actual airspeed than a straight-wing aircraft.**

(6) **Drag curves** are approximately the reverse of the lift curves, in that a rapid increase in drag component may be expected with an increase of angle of attack with the swept wing; the amount being directly related to the degree of sweep or reduction of aspect ratio.

(7) **The extension of trailing edge flaps and leading edge devices** may, in effect, further reduce the aspect ratio of the swept wing by increasing the wing chord. This interplay of forces should be well understood by the pilot of the swept-wing aircraft, since raising the nose of the aircraft to compensate for a mild undershoot during a landing approach at normal approach speeds will produce little lift, but may instead lead to a rapid decay in airspeed, thus rapidly and critically compromising the margin of safety.

(8) Another method of increasing the critical MACH number of an aircraft wing is through the use of a high-speed laminar airflow airfoil in which a small leading edge radius is combined with a reduced thickness ratio. This type of wing design is more tapered with its maximum thickness further aft, thus distributing pressures and boundary layer air more evenly along the chord of the wing. This tends to reduce the local flow velocities at high MACH numbers and improve aircraft control qualities.

(9) Several modern straight-wing, turbojet aircraft make use of the design method described in paragraph 2. To delay the onset of MACH buzz and obtain a higher Mmo, these aircraft designs may incorporate the use of both **vortex generators** and small triangular upper wing strips as **boundary layer energizers**. Both systems seem to work equally well, although the boundary layer energizers

generally produce less drag. Vortex generators are small vanes affixed to the upper wing surface, extending approximately 1 to 2 inches in height. This arrangement permits these vanes to protrude through the boundary layer air. The vortex generators deflect the higher energy airstream downward over the trailing edge of the wing and accelerate the boundary layer aft of the shock wave. This tends to delay shock-induced flow separation of the boundary layer air which causes **aileron buzz**, and thus permits a higher Mmo. The lift characteristics of straight-wing and swept-wing airplanes related to changes in AOA are more favorable for swept-wing airplanes. An increase in the AOA of the straight wing airplane produces a substantial and constantly increasing lift vector up to its maximum coefficient of lift and, soon thereafter, flow separation (stall) occurs with a rapid deterioration of lift.

(10) By contrast, the swept wing produces a much more gradual buildup of lift with no well-defined maximum coefficient, the ability to fly well beyond this point, and no pronounced stall break. The lift curve of the short, **low-aspect ratio** (short span, long chord) wing used on present-day military fighter aircraft compares favorably with that of the swept wing, and that of other wing designs which may be even more shallow and gentle in profile.

(11) Regardless of the method used to increase the critical MACH number, airflow over the wing is normally smooth. However, as airspeed increases, the smooth flow becomes disturbed. **The speed at which this disturbance is usually encountered is determined by the shape of the wing and the degree of sweep.**

(12) When the aircraft accelerates, the airflow over the surface of the wing also accelerates until, at some point on the wing, it becomes **sonic. The indicated airspeed at which this occurs is the critical MACH number (MACH crit) for that wing.**

b. Jet Engine Efficiency.

(1) The efficiency of the jet engine at high altitudes is the primary reason for operating in the high-altitude environment. **The specific fuel consumption of jet engines decreases as the outside air temperature decreases for constant revolutions per minute (RPM) and TAS.** Thus, by flying at a high altitude, the pilot is able to operate at flight levels where fuel economy is best and with the most advantageous cruise speed. For efficiency, jet aircraft are typically operated at high altitudes where cruise is usually very close to RPM or exhaust gas temperature limits. At high altitudes, little excess thrust may be available for maneuvering. **Therefore, it is often impossible for the jet aircraft to climb and turn simultaneously,** and all maneuvering must be accomplished within the limits of available thrust and without sacrificing stability and controllability.

(2) **Compressibility** also is a significant factor in high-altitude flight. The **low temperatures** that make jet engines more efficient at high altitudes also **decrease the speed of sound.** Thus, for a given TAS, the MACH number will be significantly higher at high altitude than at sea level. This compressibility effect due to supersonic airflow will be encountered at slower speeds at high altitude than when at low altitude.

c. Controllability Factors.

(1) Static stability is the inherent flight characteristic of an aircraft to return to equilibrium after being disturbed by an unbalanced force or movement.

(2) Controllability is the ability of an aircraft to respond positively to control surface displacement, and to achieve the desired condition of flight.

(3) At high-flight altitudes, aircraft stability and control may be greatly reduced. Thus, while high-altitude flight may result in high TAS and high MACH numbers, calibrated airspeed (CAS) is much slower because of reduced air density. This reduction in density means that the AOA must be increased to maintain the same coefficient of lift with increased altitude. Consequently, jet aircraft operating at high altitudes and high MACH numbers may simultaneously experience problems associated with slow-speed flight such as **Dutch roll, adverse yaw,** and stall. In addition, the reduced air density reduces aerodynamic damping, overall stability, and control of the aircraft in flight.

(i) **Dutch roll is a coupled oscillation in roll and yaw that becomes objectionable when roll, or lateral stability is reduced in comparison with yaw or directional stability.** A stability augmentation system is required to be installed on the aircraft to dampen the Dutch roll tendency when it is determined

to be objectionable, or when it adversely affects the control stability requirements for certification. The yaw damper is a gyro-operated autocontrol system installed to provide rudder input and aid in canceling out yaw tendencies such as those in **Dutch roll.**

(ii) **Adverse yaw** is a phenomenon in which the airplane heading changes in a direction opposite to that commanded by a roll control input. **It is the result of unequal lift and drag characteristics of the down-going and up-going wings.** The phenomena are alleviated by tailoring the control design by use of **spoilers, yaw dampers,** and interconnected rudder and aileron systems.

(4) **Supersonic flow** over the wing is responsible for:

(i) The formation of shock waves on the wing which result in drag rise.

(ii) An aft shift in the center of lift resulting in a nosedown pitching moment called MACH tuck.

(iii) Airflow separation behind the shock waves resulting in MACH buffet.

(5) Swept wing and airfoil design alone, with boundary layer energizers such as the vortex generators described earlier, has reduced the hazardous effect of the problems described above. However, these problems are still encountered to some extent by the modern turbojet airplane in high-altitude flight.

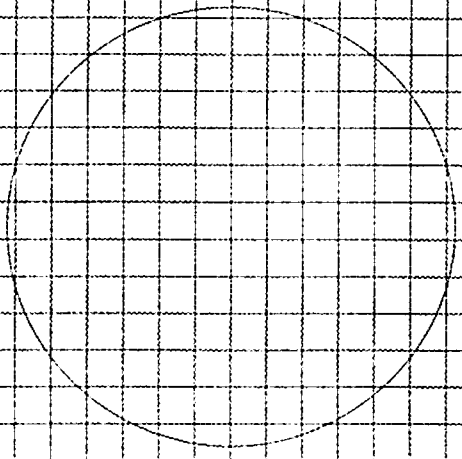
(6) In general, this outline has been confined to normal level, unaccelerated 1.0 G-flight. When turning or maneuvering about the pitch axis, however, acceleration of G-forces can occur while maintaining a constant airspeed. As G-forces increase, both the aircraft's aerodynamic weight and AOA increase. The margin over low-speed stall buffet decreases, as well as the margin below MACH buffet, because of the increased velocity of the air over the wing resulting from the higher angle of attack. This, in effect, could lower the aerodynamic ceiling for a given gross-weight. Increased G-loading can also occur in nonmaneuvering flight because of atmospheric turbulence **or the lack of fine-touch skill by the pilot.** Pilots flying at high altitudes in areas where turbulence may be expected must carefully consider acceptable safety margins necessary to accommodate the sudden and unexpected vertical accelerations which may be encountered with little or no warning. How wide is the safety margin between low-speed and high-speed buffet boundaries for an altitude and weight in a 30° bank? The answer may be easily determined by reference to the **Cruise Maneuver/Buffet Limit Chart for a particular aircraft.** For example, in a typical jet aircraft, the 1.0 G buffet-free margin at FL 350 is 135 K; at FL 450 this speed is reduced to a mere 26 K. **Thus, the safety margin in airspeed spread diminishes rapidly as the aircraft climbs and leaves little room for safety in the event of a air turbulence encounter or accidental thunderstorm penetration.**

(7) If a thunderstorm cannot be avoided, follow high-altitude thunderstorm penetration procedures and avoid over-action of thrust levers. When excessive airspeed buildup occurs, pilots may wish to use speed brakes. The use of aerodynamic speed brakes, when they are part of the lateral control system, may change the roll rate any time there is a lateral control input.

(8) **For detailed information concerning the operation of specific turbojet aircraft, refer to the aircraft's Airplane Fight Manual (AFM).**

Ref.: AC 61-107, 1-23-91

Flight Notes



Pilot Currency and Additional Qualification Requirements For Certificated Pilots

Biennial Flight Review (BFR)
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Flight Review
Biennial Flight Review (BFR)

1. STRUCTURE AND INTENT OF THE FLIGHT REVIEW.

With the increasing complexity of the aviation operating environment, CFI's may want more specific guidance on how to structure and plan a flight review and develop contents which are tailored to the needs of the pilot being reviewed. The flight review is intended to be an industry-managed, FAA-monitored currency program. The CFI must be aware that the flight review is not a test or check ride, but an instructional service designed to assess a pilot's knowledge and skills.

a. Under CFR 61.56(b) no person may act as pilot in command (PIC) of an aircraft unless within the preceding 24 calendar months that person has accomplished a successful flight review in an aircraft for which that pilot is rated, given by an appropriately rated instructor or other designated person. The objective of the flight review is to ensure that pilots who intend to act as PIC have the opportunity to ride with a flight instructor of their own choice within a specified period for an appraisal of their pilot proficiency and to seek assistance or guidance if any deficiency is identified.

b. Pilots and CFI's are reminded that, under CFR 61.56(f), a person who has satisfactorily completed one or more phases of the FAA-sponsored Pilot Proficiency Award Program within the preceding 24 calendar months need not accomplish the flight review requirements of this section. CFI's should encourage pilots to participate in the **FAA Pilot Proficiency Award Program (also known as the Wings Program)**, which is described in the current issue of AC 61-91, Pilot Proficiency Award Program.

c. Also, pilots and CFI's should be aware that, under CFR 61.56(e), pilots who have completed certain proficiency checks and ratings within the 24-month review period are not required to accomplish a separate flight review. These accomplishments include satisfactory completion of pilot proficiency checks conducted by the FAA, an approved pilot check airman, or a U.S. Armed Force for a pilot certificate, rating, or operating privilege. However, the FAA recommends that pilots consider also accomplishing a review under some of these circumstances. For example, a pilot with an airplane single-engine land rating may have recently obtained a glider rating, but may still wish to consider obtaining a flight review in a single-engine airplane if the appropriate 24-month period has nearly expired. When approached by pilots seeking advice on such matters, CFI's should consider the factors in the following paragraphs.

2. PREREVIEW CONSIDERATIONS.

Before undertaking the review the CFI should interview the pilot to determine the nature of his or her flying and operating requirements. Elements to consider should include, but not be limited to, the following areas:

a. **Type of Equipment Flown.** The maneuvers and procedures reviewed will vary depending on the category, class, and make and model of aircraft used. For example, a review in a light twin-engine aircraft should be different from one conducted in a small, two-seat tailwheel aircraft without radio or extra instrumentation. The CFI may wish to recommend that the pilot take the review in the aircraft usually flown, or in the most complex make and model used if several aircraft are flown regularly. The CFI may also wish to recommend that the pilot take a review in more than one category/class of aircraft under certain circumstances. For example, a pilot with airplane single-engine land and glider ratings may have flown only gliders in the last 2 years but is also contemplating flying single-engine airplanes in the near future. If a CFI is approached by a pilot who requests a review only in the glider, the CFI may wish to recommend an additional review by a qualified person in a single-engine airplane before the pilot acts as PIC of a single-engine airplane.

b. **Nature of Flight Operations.** The CFI should consider the type of flying usually done by the pilot before establishing the review plan for conducting his or her review. For example, a pilot conducting long-distance flights between busy terminal areas may need a different review than a pilot who usually flies in the local area from the same airport. The CFI should consider the need for an in-depth review of certain subjects or procedures if the type of flight operations is likely to change or if other extenuating circumstances exist. For example, a pilot who normally conducts only

local flight in class D and E airspace may be planning to begin flying to a location within class B airspace. Another pilot may only operate a two-seat aircraft without radio but will operate in close proximity to class B airspace. In both cases, the CFI should include National Airspace System (NAS) requirements and operating procedures in the flight review.

c. **Amount and Recency of Flight Experience.** The CFI should review the pilot's logbook to determine total flight time and type and recency of experience in order to evaluate the need for particular maneuvers and procedures in the review. For example, a pilot who has not flown in several years may require an extensive review of basic maneuvers from the **Practical Test Standards (PTS)** appropriate to that pilot's grade of certificate. This same pilot may also require a more extensive review of CFR Part 91, including recent changes in airspace and other requirements. Another pilot who is upgrading to a newer or faster airplane should receive more emphasis on knowledge of aircraft systems and performance or in cross-country procedures appropriate to a faster airplane. Regardless of flight experience, the CFI should ensure that the review plan includes all areas in which he or she determines that the pilot should receive training in order to operate safely. In some cases, the CFI may wish to recommend that the pilot undertake a complete refresher program such as those included in the current issue of AC 61-10, Private and Commercial Pilots Refresher Courses.

d. **Agreement on Conduct of Review.** After completing the above analysis, the CFI should review these considerations with the pilot and reach an understanding regarding how the review will be conducted. The CFI may wish to provide the pilot with reading materials or recommend publications for study before actually undertaking the flight review. The CFI should also review the criteria for satisfactory completion of the review with the pilot.

e. **Instructor Qualifications.** Instructors should also consider their own experience and qualifications in a given make and model aircraft prior to giving a review in that model. The CFI conducting a flight review must hold a category, class, and, if appropriate, type rating on his or her pilot certificate. Also, the instructor must have a category and class rating on his or her flight instructor certificate appropriate to the aircraft in which the review is to be conducted. Flight reviews conducted in multiengine airplanes must be conducted by flight instructors who hold an airplane multiengine rating on their pilot and flight instructor certificates. For aircraft in which the CFI is not current or with which he or she is not familiar, recent flight experience or sufficient knowledge of aircraft limitations, characteristics, and performance should be obtained before giving the review. In any case, the rating limitations of CFR 61.195(b) should be observed.

3. PLANNING AND RECORDING THE REVIEW.

After reaching agreement on how the review will be conducted, the CFI should prepare a plan for completing the review. The plan should include a list of regulatory subjects to be covered, the maneuvers and procedures to be accomplished, the anticipated sequence in which the segments will occur, and the location where the review will be performed. A suggested plan format can be found in Appendix 1 (page 7.15). Although not required by CFR 61.189, the CFI may wish to retain this plan for an appropriate time period as a record of the scope and content of the review.

a. **Review of CFR Part 91 Operating and Flight Rules.** The CFI should tailor the review of general operating and flight rules to the needs of the pilot being reviewed. The objective is to ensure that the pilot can comply with all regulatory requirements and operate safely in various types of airspace under an appropriate range of weather conditions. As a result, the instructor should conduct a review that is broad enough to meet this objective, yet provide more comprehensive review in those areas in which the pilot's knowledge is weaker. In the latter instance, the instructor may wish to employ a variety of reference sources, such as the **Aeronautical Information Manual (AIM)**, to ensure that the pilot's knowledge meets current standards.

b. **The occurrence of incidents and pilot deviations in controlled airspace has emphasized the need to ensure that all pilots are familiar with the operational requirements for each of the various types or classes of airspace**, Airport Radar Service Areas, and other types of airspace. The flight review may be the only regular proficiency and recurrency training experienced by some pilots. Therefore, instructors should place appropriate emphasis on this part of the review.

c. Pilots and CFI's should note that a total revision and reorganization of CFR Part 91 became effective on August 18, 1990. The sample format outline for the BFR Flight Review on page 7.6, may provide a useful format for organizing the CFR Part 91 review and ensuring that essential areas are covered. The review should be expanded in those areas where the pilot's knowledge is less extensive.

d. **Review of Maneuvers and Procedures.**

(1) The maneuvers and procedures covered during the review are those which, in the opinion of the CFI conducting the review, are necessary for the pilot to perform in order to demonstrate that he or she can safely exercise the privileges of his or her pilot certificate. Accordingly, the instructor should evaluate the pilot's skills and knowledge to the extent necessary to ensure that he or she can safely operate within regulatory requirements throughout a wide range of conditions.

(2) **The instructor may wish to prepare a preliminary plan for the flight review based on an interview or other assessment of the pilot's qualifications and skills.** A sequence of maneuvers should be outlined to the pilot taking the review. For example, this may include a flight to the practice area or to another airport with maneuvers accomplished while en route. It could also include a period of **simulated instrument flight time.** The instructor should request that the pilot conduct whatever preflight preparation is necessary to complete the planned flight. This could include checking weather, calculating required runway lengths, calculating weight and balance, completing a flight log, filing a flight plan, and conducting the preflight inspection.

(3) **Before commencing the flight portion of the review, the instructor should discuss various operational areas** with the pilot. This oral review should include, but not be limited to, areas such as aircraft systems, speeds, and performance; meteorological and other hazards (e.g., windshear and wake turbulence); and operations in the National Airspace System. The emphasis during the discussion should be on practical knowledge of recommended procedures and regulatory requirements.

(4) Regardless of the pilot's experience, the instructor may wish to review at least those maneuvers considered critical to safe flight, such as stalls, slow flight, and takeoffs and landings. Based on his or her in-flight assessment of the pilot's skills, the instructor may wish to add other maneuvers from the PTS appropriate to the pilot's grade of certificate.

(5) **The in-flight review** need not be limited to evaluation purposes. The instructor may provide additional instruction in weak areas or, based on mutual agreement with the pilot, defer this instruction to a followup flight.

(6) **To assist CFI's in selecting maneuvers and procedures critical to safe flight,** a list of maneuvers for various categories and classes of aircraft is included in Appendix 2 (page 7.16). It must be emphasized that this list should not be considered all-inclusive or intended to limit a CFI's discretion in selecting appropriate maneuvers and procedures.

(7) **Consistent with the need to include critical maneuvers,** the CFI should construct a review sequence which closely duplicates a typical profile for the pilot who will receive the review.

4. POSTREVIEW CONSIDERATIONS.

Upon completion of the review, the instructor should complete the Flight Review Plan and Checklist (if used) and debrief the pilot. Whether or not the review was satisfactory, the instructor should provide the pilot with a comprehensive analysis of his or her performance, including suggestions for improving any weak areas.

a. **Unsatisfactory Completion** of the Review. The instructor should not endorse the pilot's logbook to note an unsatisfactory review, but should sign the logbook to record the instruction given. The CFI should then recommend additional training in the areas of the review that were unsatisfactory. A pilot who is denied an endorsement for a flight review may continue to exercise the privileges of his or her certificate, provided a period of 24 calendar months has not elapsed since the pilot's last successful flight review or pilot proficiency check. If a pilot has performed a flight review and, in the pilot's opinion the flight instructor has unfairly judged that he or she was unable to successfully complete the review, the pilot may request a flight review from another CFI.

b. **Satisfactory Completion** of the Review. When the applicant has successfully completed the review, the pilot's logbook must be endorsed by the person who gave the review, certifying that the pilot has satisfactorily accomplished the flight review. The endorsement for a satisfactory review should be in accordance with the current issue of AC 61-65 (page 8.10).

Ref.: AC 61-98A, 3-26-91

Subpart	Description	Remarks
A	General	All pilots
B	Flight Rules (General) Visual Flight Rules Instrument Flight Rules	All Pilots All Pilots If applicable (example-Instrument rated pilot)
C	Equipment, Instrument, and Certificate Requirements	All Pilots
D	Special Flight Operations	If applicable (example-pilot involved in glider towing operations)
E	Maintenance, Preventive Maintenance, and Alterations	All pilots
F	Large and Turbine-Powered Multiengine Airplanes	If applicable (note-pilot may be subject to requirements of CFR 61.58
G	Additional Equipment and Operating Requirements for Large Transport Category Aircraft	If applicable (see note-CFR, Subpart F)
H	Foreign Aircraft Operations and Operations of U.S. Registered Civil Aircraft Outside of the United States	If applicable (example-flights to Canada or Mexico)
I	Operating Noise Limits	If applicable (example-agricultural aircraft pilot)
J	Waivers	If applicable (example - pilot involved in airshows)

Sample Format For "Organizing" The CFR Part 91 (BFR) Flight Review

Recent Flight Experience

5. RECENT GENERAL EXPERIENCE.

The minimum requirements for recent flight experience, specifically takeoffs and landings, in each category and class of aircraft in order to act as PIC of an aircraft carrying passengers are specified in CFR 61.57(c) and (d).

a. The requirements specified in CFR 61.57(c) and (d) should be regarded as minimums which need to be adjusted for various factors such as overall pilot experience, different operating environments, complexity of the facilities used, and variations in makes and models of aircraft within specific categories and classes. For example, a pilot may meet recent flight experience in a given make and model of aircraft but may have operated only in light or moderate wind conditions from airports with long runways. The pilot should consider acquiring additional takeoff and landing experience in stronger wind conditions or at airports with short runways before acting as PIC of an aircraft carrying passengers in similar conditions. Under some circumstances the change in the customary operating environment may be great enough that the pilot should seek flight instruction or refresher training before attempting even solo operations.

b. With regard to basic currency and recent flight experience, there are many excellent sources of information available to pilots who wish to enhance currency under a variety of conditions. For example, the **FAA's Back-to-Basics program** provides excellent written and video materials on takeoffs, landings, and other critical flight maneuvers. Attendance at FAA-sponsored seminars will effectively aid pilots in maintaining currency.

c. **Night currency requirements** deserve additional consideration. For example, the night experience of most pilots is only a small portion of their total flight experience. The impact of marginal weather conditions on night operations is so significant that pilots should anticipate the need for both increased currency and additional planning when contemplating flights under unfavorable conditions at night.

d. Special considerations apply to the operation of aircraft makes and models other than those customarily flown by a pilot. Analysis of accident data has shown that accident rates increase for pilots with little or no time-in-type in the aircraft flown. Additional experience requirements for operating high performance aircraft are specified in CFR 61.31(e) and are discussed later in this part of the handbook. For non-high performance small aircraft, basic currency requirements of CFR 61.57(c) and (d) apply only to category and class. For example, a pilot who meets the requirement in a Cessna 152 would also meet the requirement in a Cessna 172. The FAA recommends that pilots obtain currency in each separate make and model before conducting passenger-carrying operations. For experienced pilots, this currency should include familiarity with the **Pilot's Operating Handbook (POH), the Aircraft Flight Manual (AFM)**, and/or any other available information on that aircraft. The FAA recommends that all pilots obtain a comprehensive checkout in each make and model aircraft from an appropriately rated CFI.

e. Considerations regarding basic currency apply not only to single-engine land airplanes but to other categories and classes of aircraft, including seaplanes, gliders, helicopters, gyroplanes, and free balloons.

6. RECENT IFR EXPERIENCE.

The minimum currency requirements to act as PIC under Instrument Flight Rules (IFR), or in weather conditions less than the minimums prescribed for Visual Flight Rules (VFR), are specified in CFR 61.57(e)(1). These requirements must have been accomplished within the preceding 6 calendar months.

a. If a pilot has not accomplished the minimum IFR currency requirements within the preceding 6 calendar months, he or she may not act as PIC under IFR, nor in weather condition less than prescribed for VFR. The pilot may, however, reacquire currency if he or she completes the minimum number of hours and instrument approaches, under simulated IFR conditions only, within the next 6 months. Three of the 6 required hours and the six required approaches may be done under the supervision of an authorized instructor in a simulator or ground trainer that meets the requirements of CFR 141.14 (a)(2).

b. Additionally if a pilot has not accomplished minimum IFR currency requirements within the preceding 12 calendar months, CFR 61.57(e)(2)

states that he or she may not serve as PIC under IFR, nor in weather conditions less than the minimums prescribed for VFR, until he or she passes an instrument competency check in the category of aircraft involved(see Instrument Competency Check page 7.9).

c. Pilots should consider the minimum currency requirements of CFR 61.57(e)(1) to be the foundation for a comprehensive currency program that will enable them to **safely operate under IFR in the National Airspace System** with weather, air traffic activity, and operating conditions appropriate to their experience levels.

Instrument Competency Check

7. STRUCTURING A COMPETENCY CHECK.

CFR 61.57(e)(2) notes the conditions under which an instrument competency check must be obtained, but does not define the meaning of this check or suggest its content. Accordingly, pilots and CFI's may wish to use the following guidance in complying with this requirement.

a. CFR 61.57(e)(2) states that the competency check must be given by an FAA inspector, a member of the armed forces of the United States authorized to conduct flight tests, an FAA-approved check pilot, or a certificated instrument flight instructor. If given by a CFI in a single-engine airplane, the CFI should hold an instrument airplane rating on his or her instructor certificate. If given in a multiengine airplane, the CFI should hold both instrument airplane and airplane multiengine ratings on his or her instructor certificate. A check in a helicopter should be given by a CFI holding an instrument helicopter rating on his or her instructor certificate. These prerequisites are necessary to conform to the requirements of CFR 61.193(a) and 61.195(b), and to ensure that the CFI has qualifications appropriate to the category and class of aircraft. For example, a comprehensive instrument competency check in a multiengine airplane should require demonstration of engine-out procedures, which would necessitate a CFI with both multiengine and instrument ratings on his or her instructor certificate.

b. In addition to having the appropriate instructor ratings, the CFI should consider other factors relating to his or her ability to conduct an instrument competency check. These include the factors discussed for the flight review as well as the instructor's own instrument currency.

c. Part or all of the check may be conducted in a simulator or an approved ground trainer that meets the requirements of CFR 141.41(a)(2). If given in a ground trainer, that trainer must be specifically approved for such use, in writing, by the **FAA Flight Standards District Office (FSDO)** having jurisdiction over the geographic area where the ground trainer is used. Pilots or CFI's contemplating use of such a device for an instrument competency check should contact their local FSDO's.

d. **Precheck Considerations.** The CFI should structure an instrument competency check in a manner similar to that of the flight review, tailoring the check to the needs of the pilot, reaching mutual agreement on the scope of the check, and developing a plan for accomplishing it.

(1) The CFI and pilot should discuss the operating conditions under which the check will be conducted. If the check is conducted in an airplane, the check may be under VFR or IFR in simulated instrument conditions, or it may be under IFR in actual instrument conditions. If the check is conducted under IFR, whether conditions are simulated or actual, the CFI should ensure that the aircraft meets all CFR Part 91 requirements for operating under IFR. Additionally, if the pilot receiving the check is no longer current under IFR, the CFI should be aware that he or she will be the pilot in command during the flight and must meet IFR currency requirements. The CFI should also discuss crewmember roles and responsibilities with the pilot.

(2) Since no standards have been established for satisfactory completion of an instrument competency check, the CFI and the pilot should discuss the standards under which successful completion will be measured. The primary reference for this discussion should be the **instrument rating PTS.**

(3) Following completion of the discussion, the CFI should prepare a plan for conducting the check. The plan should list the anticipated sequence in which the procedures will occur and the location where they will be performed. A sample plan for conducting the competency check is contained in Appendix 3 (page 7.18).

8. INSTRUMENT COMPETENCY CHECK KNOWLEDGE PORTION.

a. The CFI should determine that the pilot has adequate knowledge and understanding of CFR Part 91, especially Subpart B, Instrument Flight Rules; Subpart C, Equipment, Instrument, and Certificate Requirements; and Subpart E, Maintenance, Preventive Maintenance, and Alterations.

b. Additionally, the CFI should determine that the pilot has adequate knowledge and understanding of the following areas:

(1) **Instrument en route and approach chart interpretation**, including Standard Instrument Departures (SID) and Standard Terminal Arrival Routes (STAR).

(2) **Obtaining and analyzing weather information**, including knowledge of hazardous weather phenomena.

(3) **Preflight planning**, including aircraft performance data, application of Notices to Airmen (NOTAM) information, fuel requirements, alternate requirements, and use of appropriate FAA publications such as the Airport/Facility Directory.

(4) **Aircraft systems related to IFR** operations, including appropriate operating methods, limitations, and emergency procedures due to equipment failure.

(5) **Aircraft flight instruments and navigation equipment**, including characteristics, limitations, operating techniques, and emergency procedures due to malfunction or failure, such as lost communications procedures.

(6) **Determining the airworthiness status** of the aircraft for instrument flight, including required inspections and documents.

(7) **Air Traffic Control (ATC) procedures** pertinent to flight under IFR with emphasis on elements of ATC clearances and pilot/controller responsibilities.

c. Following discussion of the above subjects, the CFI should ask the pilot to prepare for the skill portion of the competency check by completing the necessary flight planning, obtaining current weather data, filing a flight plan, and conducting the preflight inspection. In order to more fully evaluate the pilot's skills under normal operating conditions, the CFI may wish to have the pilot conduct a short IFR cross-country flight in conjunction with the rest of the competency check.

9. INSTRUMENT COMPETENCY CHECK - SKILL PORTION.

a. **The maneuvers and procedures** selected for the instrument competency check should be comprehensive enough to enable the CFI to determine that the pilot can safely operate under IFR in a broad range of conditions appropriate to the aircraft flown and the ATC environment selected. **Proper adherence to ATC clearances should be especially emphasized.**

b. Regardless of the maneuvers and procedures selected, the CFI **should ensure that the pilot demonstrates satisfactory basic attitude instrument flying skills.**

c. For checks conducted in an airplane but not under actual instrument weather conditions, an appropriate **view-limiting device** should be employed to simulate instrument conditions.

d. As an aid in selecting maneuvers and procedures for the competency check, the CFI may wish to review the list contained in Appendix 3 (page 7.18). It must be emphasized that this list should not be considered all-inclusive and is not intended to limit a CFI's discretion in selecting appropriate maneuvers and procedures.

10. POSTCHECK CONSIDERATIONS AND RECORDKEEPING.

Upon completion of the competency check, the CFI should complete the plan and checklist (if used) and debrief the pilot on the results of the check (satisfactory or unsatisfactory). Regardless of the determination, the CFI should provide the pilot with a comprehensive analysis of his or her performance, including suggestions for improving any weak areas.

a. **Unsatisfactory Performance.** The CFI should not endorse the pilot's logbook to reflect an unsatisfactory competency check, but should sign the logbook to record the instruction given.

b. **Satisfactory Performance.** The endorsement for a satisfactory competency check should be in accordance with the current issue of AC 61-65. If the sample plan and checklist in Appendix 3 (page 7.18) is used, the CFI may wish to retain the plan as a record of the scope and content of the competency check, even though not required by CFR 61.189.

Transition To Other Makes and Models Of Airplanes

11. GENERAL LIMITATIONS - HIGH PERFORMANCE AIRCRAFT.

Under CFR 61.31(e), a private or commercial pilot may not act as PIC of a high performance airplane **[one that has more than 200 horsepower (or the equivalent thrust from a turbine engine), or that has a retractable landing gear, flaps, and a controllable pitch propeller]** unless he or she has received flight instruction in such an airplane from an authorized flight instructor, and that flight instructor has certified in the pilot's logbook that he or she is competent to pilot a high performance airplane. However, this instruction is not required if the pilot has logged flight time as PIC in high performance airplanes before November 1, 1973.

a To assist pilots in transitioning to individual makes and models of high performance airplanes, the **General Aviation Manufacturers Association (GAMA)** has developed a Transition Training Master Syllabus (GAMA Specification No. 5). This publication is intended to assist CFI's and other training providers in developing transition training guides for individual makes and models of high performance airplanes, and to provide structured differences training for transition between similar makes and models of a given manufacturer. Information on obtaining this publication may be found in the current issue of AC 61-103, or by contacting GAMA directly at the following address:

General Aviation Manufacturers Association
1400 K Street, NW, Suite 801
Washington, DC 20005
(202)393-1500

b. In order to properly structure and record transition training in a high performance airplane, the CFI should plan a transition program tailored to the needs of the pilot requesting the training. A suggested format for developing such a plan is contained in Appendix 4 (page 7.20). The format is designed to incorporate the elements suggested in the GAMA publication, and yet still provide the CFI with flexibility in developing an individual transition guide tailored to a specific pilot's needs. The CFI may wish to retain the completed guide as a record of the scope and content of the transition training given, even though the record is not required by CFR 61.189.

c. CFI's and pilots should note that a recreational pilot may not act as PIC of an aircraft that is certificated for more than four occupants, that has more than 180 horsepower, or that has retractable landing gear.

d. Pilots should be aware that significant variations may exist within a basic make and model series of aircraft, even for non-high performance aircraft. For example, there are significant powerplant, systems, performance, and other differences between a Cessna 172D and a Cessna 172Q. At a minimum, pilots should conduct their own differences training and familiarization by studying the POH, AFM and/or other information sources before operating a significant variant of a specific make and model aircraft. The FAA recommends that pilots obtain such training from an appropriately rated and qualified CFI. Pilots should also be aware that CFR 91.103 requires that each PIC should, before beginning a flight, become familiar with all available information concerning that flight.

12. TRAINING REQUIREMENTS HIGH - ALTITUDE AIRCRAFT.

The requirements applicable to transition training in pressurized high altitude airplanes are specified in CFR 61.31(f). **The rule states that no person may act as PIC of a pressurized airplane that has a service ceiling or maximum operating altitude, whichever is lower, above 25,000 feet MSL unless that person has completed ground and flight training in high altitude operations and has received a logbook or training record endorsement from an authorized instructor certifying satisfactory completion of the training.** However, the rule does not apply to pilots who have completed certain proficiency checks or who have served as PIC of a high altitude airplane before March 15, 1991.

a. Recommended training to meet the high altitude training requirement may be found at page 5.1.

b. The instruction and endorsements specified in CFR 61.31(e) and (f) are one-time only requirements and need not be met for each make and model of high performance and high altitude airplane in which a person plans to act as PIC.

c. Before conducting transition training in a high performance and/or high altitude airplane, a CFI should consider his or her own qualifications and currency in that particular aircraft. Guidelines for making such an assessment are contained in the GAMA publication cited on page 7.11.

d. The guidance in this chapter is not intended to apply to transition to an aircraft requiring a type rating. Type rating training requirements are specified in CFR 61.63, 61.157, and CFR Part 141, Appendices F and H. A generic curriculum for such training is contained in the current issue of AC 61-89.

13. SOLO OPERATIONS IN AN AIRCRAFT FOR WHICH THE PILOT DOES NOT HOLD A CATEGORY AND CLASS RATING.

A person may not act as PIC of an aircraft that is carrying another person or is operated for compensation or hire, unless that person holds a category and class rating for that aircraft; however, subject to the previous restrictions, a person may act as PIC of an aircraft in solo flight without holding a category and class rating appropriate to that aircraft if he or she has received the flight instruction and endorsement required by CFR 61.31(d), or has soloed and logged PIC time in that category and class of aircraft before November 1, 1973.

a. The instruction required by CFR 61.31(d)(2) must be in the pilot operations required by CFR Part 61, appropriate to that category and class of aircraft for first solo, and must be given to the pilot by an appropriately rated CFI who, upon finding the pilot competent to solo that category and class of aircraft, so endorses the pilot's logbook. The format for the required endorsement is contained in the current issue of AC 61-65, or on page 8.10.

b. CFI's should be aware that the provisions of CFR 61.31(d) were intended to facilitate a pilot's need to acquire solo flight time in the pursuit of a category and class rating in that aircraft. This CFR section was not intended to encourage unlimited or unrestricted solo operations for an indefinite time period. Accordingly, the CFI should determine the intentions of any pilot seeking such an endorsement and should consider such requests only in cases where pilots are seeking to acquire additional category and/or class rating. In any case, CFI's should consult CFR 61.87 to determine the criteria for first solo, and may also wish to consult the appropriate PTS before advising pilots on what will be required to obtain a solo category and class endorsement. After providing the required instruction, a CFI may want to consider the need for an endorsement which restricts the pilot's operations to whatever extent the CFI considers necessary in the interest of safety. For example, the endorsement might limit the pilot to local operations only, or to flight in day-VFR conditions only. Finally, the CFI may want to include an expiration date on the endorsement which coincides with the date by which the applicant is expected to have completed the practical test. Before undertaking the instruction leading to such an endorsement, the CFI should explain to the pilot the instructor's prerogative to issue an endorsement containing restrictions.

14. EXCEPTION OF EXPERIMENTAL AIRCRAFT FROM CATEGORY AND CLASS RATING REQUIREMENTS.

Under CFR 61.31(f)(3), the category and class rating limitations of CFR 61.31 do not apply to operation of aircraft certificated as experimental. This includes aircraft originally certificated as other than experimental, but subsequently modified, as well as amateur-built experimental aircraft.

a. Pilots should approach transition to an experimental aircraft in a manner similar to that used for any new aircraft make and model. The objective in conducting a transition training program should be to ensure that the pilot has accomplished the most comprehensive preparation possible under the circumstances, appropriate to the aircraft and type of operation planned.

b. Pilots should be aware that transition to an experimental make and model aircraft may present unusual considerations and difficulties. For example, a qualified CFI or other person may not be available to conduct instruction, the aircraft may be single-place only, or there may be a lack of comprehensive operating information.

15. AMATEUR-BUILT AIRCRAFT AND SURPLUS MILITARY AIRCRAFT.

Both amateur-built aircraft and surplus military aircraft present unique requirements for CFI's and owner-operators. CFI's should carefully consider their

own qualifications in such highly individual aircraft before agreeing to provide instruction in them.

a. Special considerations apply to initial operation and flight testing of newly constructed amateur-built aircraft. For guidance in such situations, pilots should consult the latest issue of **AC 90-89, Amateur-Built Aircraft Flight Testing Handbook.**

b. Additional considerations apply to operation of surplus military aircraft which may require pilots to hold a **Letter of Authorization (LOA),** issued by the FAA. Individuals contemplating operation of such aircraft should inquire about the required procedures at an FAA FSDO.

16. TAILWHEEL AIRCRAFT.

The general flight experience requirements specified in CFR 61.57(c) state that pilots who act as PIC of a tailwheel aircraft carrying passengers or certificated for more than one required pilot flight crewmember must have made three landings to a full stop within the preceding 90 days to maintain currency.

a. Under CFR 61.31(g), no person may act as PIC of a tailwheel airplane unless that pilot has received flight instruction from an authorized flight instructor who has found the pilot competent to operate a tailwheel airplane and has made a one-time endorsement so stating in the pilot's logbook. The endorsement must certify that the pilot is competent in normal and crosswind takeoffs and landings, wheel landings (unless the manufacturer has recommended against wheel landings), and go-around procedures. The endorsement is not required if a pilot has logged flight time as PIC of tailwheel airplanes before March 15, 1991.

b. In addition to the requirements specified in CFR 61.31(g), the FAA recommends that pilots obtain a thorough checkout and transition training for each make and model of tailwheel airplane to be flown due to significant differences in operating characteristics of individual tailwheel airplanes. For example, many older types of tailwheel airplanes have pronounced or unusual **stall and spin characteristics** which differ greatly from those of more recently certificated tailwheel airplanes. In addition, many older airplanes may lack the comprehensive operating data and information typically found in pilot operating handbooks for comparable newer airplanes. Also, systems taken for granted in newer model airplanes may not exist in older aircraft, requiring a pilot to be familiar with unusual or seldom-used procedures. For example, the absence of electrical systems on many older aircraft compels the pilot to be familiar with hand propping procedures. The absence of attitude and heading gyroscopic instruments requires the pilot to depend more heavily on visual and other cues for basic aircraft control. Finally, the lack of radio equipment in many tailwheel airplanes obligates the pilot to be current in navigation by pilotage and no-radio traffic pattern procedures.

c. Additional factors may affect the instructional environment in **tailwheel airplanes equipped with tandem seating.** These factors may include reduced visibility from the rear seat, difficulty in communicating with the student due to seating position and higher noise levels, and lack of complete instrumentation or aircraft controls for the pilot in the rear seat.

d. Before conducting checkouts or other training in tailwheel airplanes, CFI's should carefully review their own qualifications. Most newly-certificated CFI's will have had little or no experience in tailwheel aircraft and will need comprehensive checkouts and transition training in tailwheel airplanes before giving instruction in them.

Pilot's Personal Currency Program.

a. Pilots should consider designing a currency program tailored to their operating environments and needs. In some cases, currency criteria may be integrated with normal operations to reduce the need for separate currency flights. For example, additional takeoffs and landings or specialized takeoffs and landings (such as short or soft field) could be incorporated into a previously scheduled flight. In most cases, pilots should consider the need for currency beyond that specified by the CFR.

b. Pilots may wish to participate in the FAA's Pilot Proficiency Program and to attend pilot safety seminars conducted through the FAA Accident Prevention Program. There are also many excellent pamphlets and other presentations, including slide programs and video tapes, available through the Accident Prevention Program.

c. Pilots should explore the wide range of publications and other commercially-developed mate-

rials which are available for use in personal currency programs. To ensure staying up to date in regulatory changes and flying techniques, pilots should also regularly read aviation periodicals of their choice.

d. To obtain assistance in developing a personal currency program, pilots may consult a wide variety of sources. These sources include pilot examiners, pilot schools, individual CFI's, Accident Prevention Program Managers, and FAA-appointed Accident Prevention Counselors. For information regarding local sources, pilots should contact the **FAA Safety Program Manager** at the nearest FAA Flight Standards District Office (FSDO).

APPENDIX 1

Sample - Flight Review Plan And Checklist

Name _____ Date _____

Grade of Certificate _____ Certificate No. _____

Ratings and Limitations _____

Class of Medical _____ Date of Medical _____

Total Flight Time _____ Time in Type _____

Aircraft to be Used: Make and Model _____ N# _____

Location of Review _____

I. REVIEW OF CFR PART 91

Ground Instruction Hours: _____

Remarks: _____

II. REVIEW OF MANEUVERS AND PROCEDURES (list in order of anticipated performance)

A. _____
B. _____
C. _____
D. _____
E. _____
F. _____
G. _____
H. _____
I. _____

Flight Instruction Hours: _____

Remarks: _____

III. OVERALL COMPLETION OF REVIEW

Remarks: _____

Signature of CFI _____ Date _____

Certificate No. _____ Expiration Date _____

I have received a flight review which consisted of the ground instruction and flight maneuvers and procedures noted above.

Signature of the Pilot _____ Date _____

APPENDIX 2

Sample - List Of Flight Review Knowledge, Maneuvers, And Procedures

All Categories and Classes of Aircraft

Pilot Certificates and other CFR Part 61 requirements
Aircraft performance and limitations
Aircraft loading, weight and balance
Aircraft systems and operating procedures
Abnormal and emergency procedures
Flight planning and obtaining weather information
Aircraft documents and records
Avoidance of hazardous weather
Air traffic control and airspace
Preflight inspection
Use of checklist
Radio communication and navigation (if aircraft equipped)
Collision avoidance, traffic pattern operations, ground operations
Navigation by pilotage

Airplane, Single-Engine Land (ASEL)

Takeoffs and landings (normal, crosswind, short and soft-field)
Go-arounds
Maneuvering during slow flight
Stalls
Constant altitude turns
Simulated forced landings and other emergency operations
Flight by reference to instruments (except recreational pilots)

Airplane, Multiengine Land (AMEL)

Same as ASEL plus:
Simulated engine-out procedures and performance

Airplane, Single-Engine Sea (ASES)

Same as ASEL (except soft-field takeoffs and landings) plus:
Glassy and rough water landings

Airplane, Multiengine Sea (AMES)

Same as ASEL, AMEL, and ASES, as applicable

Glider

Takeoff and tow procedures (appropriate to type of tow used)
Simulated rope break procedures
Stall recognition and recovery
Flight at minimum controllable airspeed
Gliding spirals
Accuracy landings

APPENDIX 2

Sample - List Of Flight Review Knowledge, Maneuvers, And Procedures (Continued)

Rotorcraft - Helicopter

Normal takeoffs and landings to a hover and to the ground
Confined area operations
Maximum performance takeoffs
Pinnacle operations
Slope operations
Quick stops
Running landings
Autorotative approaches from altitude
Hovering autorotations
Forced landings
Settling with power (demonstration)
Loss of tail rotor effectiveness
System failures; e.g., anti-ice, hydraulics, electrical, etc.

Rotorcraft, Gyroplane

Takeoff and landings (normal, crosswind, short and soft-field)
Go-arounds
Maneuvering during slow flight
Simulated emergency approach and landing
Systems and equipment malfunctions

Lighter-Than-Air, Free Balloon

Lift-offs and ascents
Descents and landings (normal and high-wind)
Level flight and contour flying
Emergency

Note: CFI's should review the applicable PTS to determine which maneuvers and procedures are associated with original pilot certification in that category and class.

APPENDIX 3

Sample - Instrument Competency Check Plan And Checklist

Name _____ Pilot Certificate No._____

Certificate and Ratings _____
Date of Last Check _____
Class Medical _____ Date of Medical _____
Total Time _____ Time in Type Aircraft _____
Total Instrument Time: _____ Simulated _____ Actual _____ Simulator/Ground Trainer _____
In Last 180 Days: Simulated _____ Actual _____ Simulator/Ground Trainer _____
Approaches/Last 180 Days: Precision _____ Nonprecision _____
Aircraft to be Used _____ Registration No. _____
Location of Check _____

I. KNOWLEDGE PORTION OF COMPETENCY CHECK

A. CFR Part 91 Review
   1. Subpart B (Instrument Flight Rules)
   2. Subpart C (Equipment, Instrument, and Certificate Requirements)
   3. Subpart E (Maintenance)

B. Instrument en route and approach charts, including SID's and STAR's

C. Weather analysis and knowledge

D. Preflight planning, including performance data, fuel, alternate, NOTAMS and appropriate publications

E. Aircraft systems as related to IFR operations

F. Aircraft flight instruments and navigation equipment, including emergency procedures such as lost communications

G. Airworthiness status of aircraft and avionics for IFR flight

H. ATC procedures, clearances, and pilot/controller responsibilities

I. Other areas:

_____
_____
_____

APPENDIX 3

Sample - Instrument Competency Check Plan And Checklist (Continued)

II. SKILL PORTION OF COMPETENCY CHECK (include location)

A. Instrument cockpit check
B. Intercepting/tracking VOR/NDB
C. Steep turns
D. Recovery from unusual attitudes
E. Basic attitude instrument flying
F. VOR approach
G. NDB approach
H. ILS approach
I. Holding procedures
J. Missed approach procedures
K. Circling approach procedures
L. Simulated engine-out (multiengine only)
M. Other areas:

III. OVERALL COMPLETION OF COMPETENCY CHECK

Remarks: _____

_____ _____
Signature of CFI Date

_____ _____
Certificate No. Expiration Date

I have received an instrument competency check which consisted of the knowledge review and skill demonstration of the procedures noted.

_____ _____
Signature of the Pilot Date

NOTE

Flight instructor and pilot should review the **Instrument Rating Flight Training Task (Maneuvers and Procedures) Airplane Single-Engine Checklist** ✓ on page 3.36

APPENDIX 4

Sample - Training Plan For Transition To High Performance Airplanes

Name _____ Date _____

Grade of Certificate _____Certificate No._____

Ratings and Limitations _____

Class of Medical _____Date of Medical _____

Total Flight Time _____ Location of Training _____

Aircraft to be Used (Make and Model) _____N# _____

GROUND INSTRUCTION - Subjects covered should include, but are not limited to:

I. AIRPLANE POH/AFM REVIEW

A. General Description and Safety Features
B. Limitations

II. AIRPLANE SYSTEMS INCLUDING NORMAL, ABNORMAL, AND EMERGENCY PROCEDURES

A. Flight Instruments, Avionics, and Autopilot (if appropriate)
B. Controls and Trim Controls
C. Powerplant(s)/Propeller(s)
D. Fuel
E. Landing Gear
F. Flaps
G. Electrical
H. Hydraulic
I. Environmental
J. Pressurization
K. Ice Protection
L. Oxygen

III. FLIGHT PLANNING CONSIDERATIONS SPECIFIC TO AIRPLANE TO BE USED

A. Performance Date
B. Weight and Balance
C. Review of Instrument Procedures Appropriate to Avionics Capability of the Aircraft - (if the pilot is instrument rated)
D. Minimum Equipment List (if applicable)
E. Servicing Requirements

IV. CHECKLIST AND OPERATIONAL PROCEDURES

A. Review of Operational Considerations for High performance Airplanes in Airport Traffic Patterns
B. Review Local Departure and Arrival Procedures
C. Review Procedures for Each Maneuver to be Accomplished

Hours of Ground Instruction Completed: _____

APPENDIX 4

Sample - Training Plan For Transition To High Performance Airplanes (Continued)

FLIGHT INSTRUCTION: (refer to the applicable PTS)

Maneuvers and procedures accomplished should include, but are not limited to:

I. PREFLIGHT INSPECTION

II. CHECKLIST AND PRESTART PROCEDURES

III. STARTING ENGINE(S)
- A. Battery Starts
- B. External Power Starts (may be accomplished by simulated demonstration)

IV. NORMAL DEPARTURE OPERATIONS
- A. Taxiing - Emphasis on Directional Control Procedures Which May Require the Use of Techniques Unfamiliar to the Pilot
- B. Pretakeoff Checks
- C. Normal Takeoff
- D. Climb - Emphasis on Collision Avoidance and Appropriate Power Settings
- E. Cruise - Checklist Completion and Cockpit Resource Management

V. AIR WORK
- A. Constant Altitude Turns
- B. Flight at Critically Slow Airspeeds
- C. Stall Recognition and Recovery in all Applicable Configurations
- D. Emergency Operations of All Systems (in accordance with manufacturer's recommendations
- E. Engine-out Procedures (if in a multiengine airplane)
- F. Recovery from Unusual Attitudes by Reference to Instruments
- G. Simulated Emergency Descent

VI. NORMAL ARRIVAL OPERATIONS
- A. Descent and In-Range Checklist Procedures
- B. Normal Landings

VII. PATTERN WORK
- A. Crosswind, Short, and Soft-Field Takeoffs and Landings (if appropriate to aircraft)
- B. Go-Arounds
- C. Aborted Takeoff
- D. Zero Flap Landing
- E. Engine-out Procedures (if in a multiengine airplane)

VIII. INSTRUMENT APPROACH, DEPARTURE, AND EN ROUTE PROCEDURES (if instrument rated)

IX. AFTER LANDING AND POSTFLIGHT PROCEDURES

Hours of Flight Instruction Completed: _____

APPENDIX 4

Sample - Training Plan For Transition To High Performance Airplanes (Continued)

OVERALL COMPLETION OF TRANSITION TRAINING;

Remarks: _____

_____

Signature of CFI _____ Date _____

Certificate No. _____ Expiration Date: _____

I have received transition training to high performance airplanes and completed the ground and flight training noted above.

Signature of the Pilot _____ Date _____

Ref: AC 61-98A, 3-26-91

Special Reference Supplements

U.S. Department
of Transportation

Federal Aviation Administration

Advisory Circular

Subject: AIRWORTHINESS DIRECTIVES Date: 11-16-95 AC No: 39-7C
Initiated by: AFO-340

1. **PURPOSE.** This advisory circular (AC) provides guidance and information to owners and operators of aircraft concerning their responsibility for complying with airworthiness directives (AD) and recording AD compliance in the appropriate maintenance records.

2. **CANCELLATION.** AC 39-7B, Airworthiness Directives, dated April 8, 1987, is cancelled.

3. **PRINCIPAL CHANGES.** References to specific federal aviation regulations have been updated and text reworded for clarification throughout this document.

4. **RELATED FEDERAL AVIATION REGULATIONS.** 14 Code of Federal Regulations (CFR) part 39; part 43 §§ 43.0 and 43.11; §§ 91.403, 91.417, and 91.419.

5. **BACKGROUND.** The authority for the role of the Federal Aviation Administration (FAA) regarding the promotion of safe flight for civil aircraft may be found generally at Title 49 of the United State Code (USC) § 44701 et. seq. (formerly, Title VI of the Federal Aviation Act of 1958 and related statutes). One of the ways the FAA has implemented its authority is through 14 CFR part 39, Airworthiness Directives. Pursuant to its authority, the FAA issues AD's when an unsafe condition is found to exist in a product (aircraft, aircraft engine, propeller, or appliance) of a particular type design. AD's are used by the FAA to notify aircraft owners and operators of unsafe conditions and to require their correction. AD's prescribe the conditions and limitations, including inspection, repair, or alteration under which the product may continue to be operated. AD's are authorized under part 39 and issued in accordance with the public rulemaking procedures of the Administrative Procedure Act, 5 USC 553, and FAA procedures in part 11.

6. **AD CATEGORIES.** AD's are published in the Federal Register as amendments to part 39. Depending on the urgency, AD's are issued as follows:

a. Normally notice of proposed rulemaking (NPRM) for an AD is issued and published in the **Federal Register** when an unsafe condition is found to exist in a product. Interested persons are invited to comment on the NPRM by submitting such written data, views, contained in the notice may be changed or withdrawn in light of comments received. When the final rule, resulting from the NPRM, is adopted, it is published in the **Federal Register**, printed and distributed by first class mail to the registered owners and certain known operators of the product(s) affected.

b. **Emergency AD's.** AD's of an urgent nature may be adopted without prior notice (without an NPRM) under emergency procedures as immediately adopted rules. The AD's normally be come effective in less than 30 days after publication in the **Federal Register** and are distributed by first class mail, telegram, or other electronic methods to the registered owners and certain known operators of the product affected. In addition, notification is also provided to special interest groups, other government agencies, and Civil Aviation Authorities of certain foreign countries.

7. **AD's WHICH APPLY TO PRODUCTS OTHER THAN AIRCRAFT.** AD's may be issued which apply to aircraft engines, propellers, or appliances installed on multiple makes or models of aircraft. When the product can be identified as being installed on a specific

make or model aircraft, the AD is distributed by first class mail to the registered owners of those aircraft. However, there are times when such a determination cannot be made, and direct distribution to registered owners is impossible. For this reason, aircraft owners and operators are urged to subscribe to the Summary of Airworthiness Directives which contains all previously published AD's and biweekly supplemental service. Advisory Circular 39-6, Announcement of Availability-Summary of Airworthiness Directives, provides ordering information and subscription prices on these publications. The most recent copy of AC 39-6, may be obtained, without cost, from the U.S. Department of Transportation, General Services Section, M-483.1, Washington, D.C. 20590. Information concerning the Summary of Airworthiness Directives may also be obtained by contacting the FAA, Manufacturing Standards Section (AFS-613), P.O. Box 26460, Oklahoma City, Oklahoma 73125-0460. Telephone (405) 954-4103, FAX (405) 954-4104.

8. **APPLICABILITY OF AD's.** Each AD contains an applicability statement specifying the product (aircraft, aircraft engine, propeller, or appliance) to which it applies. Some aircraft owners and operators mistakenly assume that AD's do not apply to aircraft with other than standard airworthiness certificates, i.e., special airworthiness certificates in the restricted, limited, or experimental category. Unless specifically stated, AD's apply to the make and model set forth in the applicability statement regardless of the classification or category of the airworthiness certificate issued for the aircraft. Type certificate and airworthiness certification information are used to identify the product affected. Limitations may be placed on applicability by specifying the serial number or number series to which the AD is applicable. When there is no reference to serial numbers, all serial numbers are affected. The following are examples of AD applicability statements:

a. "Applies to Smith (Formerly Robin Aero) RA-15-150 series airplanes, certificated in any category." This statement, or one similarly worded, makes the AD applicable to all airplanes of the model listed, regardless of the type of airworthiness certificate issued to the aircraft.

b. "Applies to Smith (Formerly Robin Aero) RA-15-150 Serial Numbers 15-1081 through 15-1098." This statement, or one similarly worded, specifies certain aircraft by serial number within a specific model and series regardless of the type of airworthiness certificate issued to the aircraft.

c. "Applies to Smith (Formerly Robin Aero) RA-15-150 series aircraft certificated in all categories excluding experimental aircraft." This statement, or one similarly worded, makes the AD applicable to all airplanes except those issued experimental airworthiness certificates.

d. "Applicability: Smith (Formerly Robin Aero) RA-15-150 series airplanes; Cessna Models 150, 170, and 175 series airplanes; and Piper PA-28-140 airplanes; certificated in any category, that have been modified in accordance with STC SA807NM using ABLE INDUSTRIES, Inc. (Part No. 1234) muffler kits." This statement, or one similarly worded, makes the AD applicable to all airplanes listed when altered by supplemental type certificate listed, regardless of the type of airworthiness certificate issued to the aircraft.

e. Every AD applies to each product identified in the applicability statement, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of the AD. For products that have been modified, altered, or repaired so that performance of the requirements of the AD is affected, the owner/operator must use the authority provided in the alternative methods of compliance provision of the AD (see paragraph 12) to request approval from the FAA. This approval may address either no action, if the current configuration eliminates the unsafe condition or, different actions necessary to address the unsafe condition described in the AD. In no case, does the presence of any alteration, modification, or repair remove any product from the applicability of this AD. Performance of the requirements of the AD is "affected" if an operator is unable to perform those requirements in the manner described in the AD. In short, either the requirements of AD can be performed as specified in the AD and the specified results can be achieved, or they cannot.

9. **AD COMPLIANCE.** AD's are regulations issued under part 39. Therefore, **no person may operate a product to which an AD applies, except in accordance with the requirements of that AD.** Owners and operators should understand that to "operate" not only means piloting the aircraft, but also causing or autho-

rizing the product to be used for the purpose of air navigation, with or without the right of legal control as owner, lessee, or otherwise. Compliance with emergency AD's can be a problem for operators of leased aircraft because FAA has no legal requirement for notification of other than registered owners. Therefore, it is important that the registered owner(s) of leased aircraft make the AD information available to the operators leasing their aircraft as expeditiously as possible, otherwise the lessee may not be aware of the AD and safety may be jeopardized.

10. COMPLIANCE TIME OR DATE.

a. The belief that AD compliance is only required at the time of a required inspection, e.g., at a 100-hour or annual inspection is **not correct.** The required compliance time is specified in each AD, and no person may operate the affected product after expiration of that stated compliance time.

b. Compliance requirements specified in AD's are established for safety reasons and may be stated in various ways. Some AD's are of such a serious nature they require compliance before further flight, for example: "To prevent uncommanded engine shutdown with the inability to restart the engine, prior to further flight, inspect...." Other AD's express compliance time in terms of a specific number of hours in operation, for example: "Compliance times may also be expressed in operational terms, such as: "Within the next 10 landings after the effective date of this AD...." For turbine engines, compliance times are often expressed in terms of cycles. A cycle normally consists of an engine start, takeoff operation, landing, and engine shutdown.

c. When a direct relationship between airworthiness and calendar time is identified, compliance time may be expressed as a calendar date. For example, if the compliance time is specified as "within 12 months after the effective date of this AD...." with an effective date of July 15, 1995, the deadline for compliance is July 15, 1996.

d. In some instances, the AD may authorize flight after the compliance date has passed, provided that a special flight permit is obtained. Special flight authorization may be granted only when the AD specifically permits such operation. Another aspect of compliance times to be emphasized is that not all AD's have a one-time compliance requirement. Repetitive inspections at specified intervals after initial compliance may be required in lieu of, or until a permanent solution for the unsafe condition is developed.

11. ADJUSTMENTS IN COMPLIANCE REQUIREMENTS. In some instances, a compliance time other than the compliance time specified in the AD may be advantageous to an aircraft owner or operator. In recognition of this need, and when an acceptable level of safety can be shown, flexibility may be provided by a statement in the AD allowing adjustment of the specified interval. When adjustment authority is provided in an AD, owners or operators desiring to make an adjustment are required to submit data substantiating their proposed adjustment to their local FAA Flight Standards District Office or other FAA office for consideration as specified in the AD. The FAA office or person authorized to approve adjustment in compliance requirements is normally identified in the AD.

12. ALTERNATIVE METHODS OF COMPLIANCE. Many AD's indicate the acceptability of one or more alternative methods of compliance. **Any alternative** method of compliance or adjustment of compliance time other than that listed in the AD must be substantiated and approved by the FAA before it may be used. Normally the office or person authorized to approve an alternative method of compliance is indicated in the AD.

13. RESPONSIBILITY FOR AD COMPLIANCE AND RECORDATION. **The owner or operator of an aircraft is primarily responsible** for maintaining that aircraft in an airworthy condition, including compliance with AD's.

a. This responsibility may be met by ensuring that properly certificated and appropriately rated maintenance person(s) accomplish the requirements of the AD and properly record this action in the appropriate maintenance records. This action must be accomplished within the compliance time specified in the AD or the aircraft may not be be operated.

b. Maintenance persons may also have direct responsibility for AD compliance, aside from the times when AD compliance is the specific work contracted for by the owner or operator. When a 100-hour, annual, progressive, or any other inspection required under parts 91, 121, 125, or 135 is accomplished, §

43.15 (a) requires the person performing the inspection to determine that all applicable airworthiness requirements are met, including compliance with AD's.

c. Maintenance persons should note even though an inspection of the complete aircraft is not made, if the inspection conducted is a progressive inspection, determination of AD compliance is required for those portions of the aircraft inspected.

d. For aircraft being inspected in accordance with a continuous inspection program (§ 91.409), the person performing the inspection must ensure that an AD is complied with only when the portion of the inspection program being handled by that person involves an area covered by a particular AD. The program may require a determination of AD compliance for the entire aircraft by a general statement, or compliance with AD's applicable only to portions of the aircraft being inspected, or it may not require compliance at all. This does not mean AD compliance is not required at the compliance time or date specified in the AD. It only means that the owner or operator has elected to handle AD compliance apart from the inspection program. **The owner or operator remains fully responsible for AD compliance.**

e. The person accomplishing the AD is required by § 43.9 to record AD compliance. The entry must include those items specified in § 43.9 (a) (1) through (a) (4). The owner or operator is required by § 91.405 to ensure that maintenance personnel make appropriate entries and, by § 91.417, to maintain those records. Owners and operators should note that there is a difference between the records required to be kept by the owner under § 91.417 and those § 43.9 requires maintenance personnel to make. In either case, **the owner or operator is responsible for maintaining proper records.**

f. Pilot Performed AD Checks. Certain AD's permit pilots to perform checks of some items under specific conditions. AD's allowing this action will include specific direction regarding recording requirements. However, if the AD does not include recording requirements for the pilot, § 91.417 (a) and (b) requires the owner or operator to keep and retain certain minimum records for a specific time. The person who accomplished the action, the person who returned the aircraft to service, and the status of AD compliance are the items of information required to be kept in those records.

14. **RECURRING/PERIODIC AD'S.** Some AD'S require repetitive or periodic inspection. In order to provide for flexibility in administering such AD's, an AD may provide for adjustment of the inspection interval to coincide with inspections required by part 91, or other regulations. The conditions and approval requirements under which adjustments may be allowed are stated in the AD. If the AD does not contain such provisions, adjustments are usually permitted. However, amendment, modification, or adjustment of the terms of the AD may be requested by contacting the office that issued the AD or by following the petition procedures provided in part 11.

15. **DETERMINING REVISION DATES.** The revision date required by § 91.417 (a) (2) (v) is the effective date of the latest amendment to the AD and may be found in the last sentence of the body of each AD. For example: "This amendment becomes effective on July 10, 1995." Similarly, the revision date for an **emergency** AD distributed by telegram or priority mail is the **date it was issued.** For example: "Priority Letter AD 95-11-09, issued May 25, 1995, becomes effective upon receipt." Each **emergency** AD is normally followed by a final rule version that will reflect the final status and amendment number of the regulation **including any changes in the effective date.**

16. **SUMMARY.** The registered owner or operator of an aircraft is responsible for compliance with AD's applicable to the airframe, engine, propeller, appliances, and parts and components thereof for all aircraft it owns or operates. Maintenance personnel are responsible for determining that all applicable airworthiness requirements are met when they accomplish an inspection in accordance with part 43.

Thomas C. Accardi
Director,
Flight Standards Service

U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

Subject: **PILOT'S SPATIAL DISORIENTATION** Date: 2-9-83 AC No: 60-4A
Initiated by: AFO-840

1. **PURPOSE.** To acquaint pilots with the hazards of disorientation caused by loss of visual reference with the surface.

2. **CANCELLATION.** Advisory Circular 60-4, Pilot's Spatial Disorientation, dated February 9, 1965, is canceled.

3. **DISCUSSION.**
   a. The attitude of an aircraft is generally determined by reference to the natural horizon or other visual references with the surface. If neither horizon nor surface references exist, the attitude of an aircraft must be determined by artificial means from the flight instruments. Sight, supported by other senses, allows the pilot to maintain orientation. However, during periods of low visibility, the supporting senses sometimes conflict with what is seen. When this happens, a pilot is particularly vulnerable to disorientation. The degree of disorientation may vary considerably with individual pilots. Spatial disorientation to a pilot means simply the inability to tell which way is "up."

   b. During a recent 5-year period, there were almost 500 spatial disorientation accidents in the United States. Tragically, such accidents resulted in fatalities over 90 percent of the time.

   c. Tests conducted with qualified instrument pilots indicate that it can take as much as 35 seconds to establish full control by instruments after the loss of visual reference with the surface. When another large group of pilots were asked to identify what types of spatial disorientation incidents they had personally experienced, the five most common illusions reported were: 60 percent had a sensation that one wing was low although wings were level; 45 percent had, on leveling after banking, tended to bank in opposite direction; 39 percent had felt as if straight and level when in a turn; 34 percent had become confused in attempting to mix "contact" and instrument cues; and 29 percent had, on recovery from steep climbing turn, felt to be turning in opposite direction.

   d. Surface references and the natural horizon may at times become obscured, although visibility may be above visual flight rule minimums. Lack of natural horizon or surface reference is common on overwater flights, at night, and especially at night in extremely sparsely populated areas, or in low visibility conditions. A sloping cloud formation, an obscured horizon, a dark scene spread with ground lights and stars, and certain geometric patterns of ground lights can provide inaccurate visual information for aligning the aircraft correctly with the actual horizon. The disoriented pilot may place the aircraft in a dangerous attitude. Other factors which contribute to disorientation are reflections from outside lights, sunlight shining through clouds, and reflected light from the anticollision rotating beacon.

   e. Another condition creating restrictions to both horizontal and vertical visibility is commonly called "white-out." "White-out" is generally caused by fog, haze, or falling snow blending with the snow-covered earth surface which may obscure all outside references.

Therefore, the use of flight instruments is essential to maintain proper attitude when encountering any of the elements which may result in spatial disorientation.

4. RECOMMENDED ACTION.

a. You, the pilot, should understand the elements contributing to spatial disorientation so as to prevent loss of aircraft control if these conditions are inadvertently encountered.

b. The following are certain basic steps which should assist materially in preventing spatial disorientation.

(1) Before you fly with less than 3 miles visibility, obtain training and maintain proficiency in aircraft control by reference to instruments.

(2) When flying at night or in reduced visibility, use your flight instruments, in conjunction with visual references.

(3) Maintain night currency if you intend to fly at night. Include cross-country and local operations at different airports.

(4) Study and become familiar with unique geographical conditions in areas in which you intend to operate.

(5) Check weather forecasts before departure, en route, and at destination. Be alert for weather deterioration.

(6) Do not attempt visual flight rule flight when there is a possibility of getting trapped in deteriorating weather.

(7) Rely on instrument indications unless the natural horizon or surface reference is clearly visible.

5. CONCLUSION. You and only you have full knowledge of your limitations. Know these limitations and be guided by them.

Kenneth S. Hunt
Director of Flight Operations

U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

Subject: **AIRPLANE FLIGHT MANUALS (AFM), APPROVED MANUAL MATERIALS, MARKINGS, AND PLACARDS - AIRPLANES**

Date: **9-25-80** AC No: **60-6B**

Initiated by: **AFO-820**

1. **PURPOSE.** This advisory circular calls attention to the regulatory requirements governing AIRPLANE FLIGHT MANUALS, APPROVED MANUAL MATERIALS, MARKINGS, and PLACARDS, and provides information useful to pilots in complying with these requirements.

2. **CANCELLATION.** Advisory Circular 60-6A, dated February 9, 1976, is cancelled.

3. **RELATED PUBLICATIONS.** Civil Air Regulations (CAR) 3, 04, 4a, 4b; Federal Aviation Regulations (FAR) Parts 21, 23, 25, 61, 91, 121; and Advisory Circular Numbers 61-9A, Pilot Transition Courses for Complex Single-Engine and Light, Twin-Engine Airplanes; 61-54A, Flight Test Guide (Part 61 revised)-Private Pilot Airplane; 61-55A, Commercial Pilot Airplane Flight Test Guide; and 61-57A, Multiengine Airplane Class and Type Ratings, Flight Test Guide.

4. **BACKGROUND.**

   a. The type certification requirements effective at the time an airplane is originally type certificated usually govern the operating limitations of that airplane, unless a supplementary type certificate has been issued, the original type certificate has been revised, or changes have been effected by specific amendments to the FAR.

   b. Accident investigations, pilot flight tests, and the observation of flight operations have indicated that many pilots are not always aware of the requirements which apply to a particular airplane. As a result, some airplanes have been operated beyond their approved operating limitations and without the required combination of placards, markings, flight manuals or approved manual materials. In some instances, this has occurred after a change in ownership, if the previous owner removed the AFM, or was engaged in air carrier operations that properly authorized the incorporation of required operating data in a company operations manual.

5. **INFORMATION.**

   a. Section 91.31 of the FAR, in part, provides that an airplane must be operated in compliance with the operating limitations as set forth in the AIRPLANE FLIGHT MANUAL, APPROVED MANUAL MATERIALS, MARKINGS, and PLACARDS for the particular airplane type. This section of the FAR also provides that these documents, or any required combination, must be current and available in the airplane during operation.

   b. AFMs are required for all airplanes certificated in the transport category. No provision exists for approval of an AFM for airplanes type certificated in the normal or acrobatic categories under CAR 04 or 4a.

   c. AFMs are also required for airplanes type certificated under CAR 3 and FAR Part 23 at gross weights over 6,000 pounds; however, all aircraft that were manufactured after March 1, 1979, must have an AFM. The required information for airplanes, type certificated at gross weights of 6,000 pounds or

under, which are not required to have an AFM, may be furnished in an airplane flight manual or in any combination of approved manual material, markings, and placards.

d. AFMs may be required for certain other airplane types which have been issued supplementary type certificates changing the original type certification requirements. Notable examples are numerous DC-3s which have been approved for operations in the transport category under a supplemental type certificate.

e. Section 21.5 of the FAR provides that for each airplane that was not certificated with an AFM and that has had no flight prior to March 1, 1979, the holder of the Type Certificate (including a Supplemental Type Certificate or the licensee of a Type Certificate) shall make available to the owner at the time of delivery of the airplane a current approved AFM. The AFM must contain operating limitations and information required to be furnished in an AFM or manual material, markings, and placards, by the applicable regulations under which the airplane was certificated. The maximum ambient atmospheric temperature for which engine cooling was demonstrated must be in the AFM performance section, if not required to be in the operating limitations section.

f. Specific placards and markings are prescribed by airworthiness standards in addition to required AFMs or approved manual materials.

g. Supplemental operating and performance information which has not been specifically or formally approved by the FAA is usually provided by the manufacturer for a particular type airplane. This information generally is in the form of an "Owner's Handbook," an "Owner's Manual," or as supplemental pages in an AFM.

h. The FAA recommends appropriate use of such unapproved information when furnished by a manufacturer, but only to the extent that such information does not conflict with the performance or operating limitations of any FAA-approved markings, placards, airplane flight manuals, or Type Certificate Data Sheet specification.

i. The principal source of information for identifying required AIRPLANE FLIGHT MANUALS, APPROVED MANUAL MATERIALS, MARKINGS, and PLACARDS is the FAA Type Certificate Data Sheet or Aircraft Specification issued for each airplane eligible for an airworthiness certificate. This information may be obtained from FAA General Aviation District Offices (GADOs), Flight Standards District Offices (FSDOs), FAA-approved aircraft repair stations, and certificated mechanics holding Inspection Authorizations. Some other aircraft repair facilities also maintain a reference library of Type Certificate Data Sheets.

6. RECOMMENDATIONS.

a. Prior to operating a civil airplane, pilots must assure that there is available in that airplane either a current AFM or approved manual materials, if required, along with necessary markings and placards. If you have any uncertainty about specific requirements for a given airplane, clear up that uncertainty through one of the above sources before you fly.

b. **Flight instructors should emphasize civil aircraft operating limitations and marking requirements as a part of student pilot training in the general operating rules of Part 91, and help each student become familiar with the information available to them in the Type Certificate Data Sheets or Aircraft Specifications.**

John S. Kern
Acting Director of Flight Operations

Authorized Instructor – Pilot Training Endorsements

Recommended Contents and Format

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Authorized Instructor (CFI) Endorsements

The following examples are recommended for use by authorized instructors when endorsing a pilot's logbook and/or student's pilot certificate, providing written statements for airmen applying for Aeronautical Knowledge Tests or Practical Tests, and/or when certifying accomplishment of requirements for pilot recent flight experience or operating privileges. Each endorsement should include the date of the endorsement, CFI's printed name, CFI's signature, CFI certificate number, and FAA certificate expiration date. A reference to the appropriate sections of 14 CFR Parts 61 and 91 is provided for each endorsement.

Student Pilot Endorsement

1. PRE-SOLO Aeronautical Knowledge Test (Written Examination): 14 CFR §61.87(b)

I certify that I administered, and that –**[Pilot Name]**– has satisfactorily completed a pre-solo aeronautical knowledge test, demonstrating knowledge of the applicable sections of 14 CFR Parts 61 and 91 for student pilots, airspace rules and procedures for the –**[Airport Name]**–, the flight characteristics and operational limitations for a –**[specify make and model aircraft]**–, and all incorrect answers were reviewed and discussed.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

2. PRE-SOLO Flight Training - (Specific Make and Model Aircraft): 14 CFR §61.87(c) and (d)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the flight training required by 14 CFR §61.87(c) and (d) in a –**[specify make and model aircraft]**–, and the named pilot has demonstrated satisfactory proficiency and safety in the performance of the maneuvers and procedures listed in 14 CFR §61.87(d). I have determined that the pilot is proficient to make SOLO Flights in a –**[specify make and model aircraft]**–.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

3. SOLO Flight – FAA Student Pilot Certificate - (Specific Make and Model Aircraft): 14 CFR §§61.87(d), and 61.87(l)(1)

The FAA **Student Pilot Certificate** must be endorsed by the authorized flight instructor who gave the flight training prescribed by 14 CFR 61.87(d) to the named certificate holder in a **–[specify make and model aircraft]–** thereby authorizing the named certificate holder to make SOLO Flights in the specific aircraft described.

NOTE: The above endorsement is only valid when accompanied by an appropriate and current logbook endorsement dated within the 90 days preceding the date of flight, see #4.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

4. SOLO Flight (90-Day Period) (Specific Make and Model Aircraft): 14 CFR §61.87(l)(2) and (n)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the flight training required by 14 CFR §61.87(c) and (d) in a –**[specify make and model aircraft]**–, and I have determined that the named pilot is proficient in the specified aircraft to be flown in SOLO Flight. ◗

NOTE: The above endorsement is only valid for SOLO Flights conducted 90 days subsequent to the date of this endorsement, and accompanied by a Student Pilot Certificate that is also endorsed for the same make and model aircraft.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

5. NIGHT SOLO Flight: 14 CFR §61.87(m)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the flight training required by 14 CFR §61.87(m) in a –**[specify make and model aircraft]**–, and I have determined that the named pilot is proficient to conduct Night SOLO Flight in the specified aircraft at the –**[Airport Name]**–, and the vicinity thereof.

NOTE: The above endorsement is only valid for SOLO Flights conducted 90 days subsequent to the date of this endorsement, and accompanied by a Student Pilot Certificate that is also endorsed for SOLO Flight in the same make and model aircraft.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

6. SOLO Takeoffs and Landings At Another Airport Within 25 nm Of The Base Training Airport: 14 CFR §§61.87(l)(1) and (2), and 61.93(b)(1)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged flight training in both directions over the route from –**[airport name]**– to –**[airport name]**–, including entering and exiting the traffic patterns, and takeoffs and landing at the airports, and has a current SOLO Flight Endorsement (student pilot certificate/logbook) in accordance with 14 CFR §61.87(l)(1) and (2), and I have determined that –**[Pilot Name]**– is proficient to make this SOLO Flight for the purpose of practicing takeoffs and landings at –**[other airport name]**–.

NOTE: The endorsing flight instructor may subject this flight authorization to stipulated limitations that the pilot must adhere to in accordance with 14 CFR §§61.89(8), and 61.93(c)(2)(ii)(C).

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

7. Repeated Specific SOLO Cross-Country Flights Not More Than 50 nm From The Point Of Departure: 14 CFR §§61.87(l)(1) and (2), and 61.93(b)(2)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged flight training in both directions over the route from –**[airport name]**– to –**[airport name]**–, including entering and exiting the traffic patterns, and takeoffs and landing at the airports, and has a current SOLO Flight Endorsement in accordance with 14 CFR §61.87(l)(1) and (2), Cross-Country Endorsements (student pilot certificate and logbook) in accordance with 14 CFR §61.93(c), and I have determined that –**[Pilot Name]**– is proficient to make SOLO Flights for the purpose of practicing takeoffs and landings at –**[other airport name]**–.

NOTE: The endorsing flight instructor may subject this flight authorization to stipulated limitations that the pilot must adhere to in accordance with 14 CFR §§61.89(8), and 61.93(c)(2)(ii)(C).

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

8. Initial SOLO Cross-Country Flight – FAA Student Pilot Certificate (Aircraft Category): 14 CFR §61.93(c)(1) and (e)

The FAA **Student Pilot Certificate** must be endorsed by the authorized flight instructor who conducted the flight training prescribed by 14 CFR 61.93(e) to the named certificate holder in a –**[specify aircraft category]**– thereby authorizing the named certificate holder to make SOLO Cross-Country Flights in the specific aircraft category described, when accompanied by a current and appropriate logbook endorsement authorizing specific flight(s) privileges.

NOTE: The above endorsement is only valid when accompanied by a current logbook SOLO Flight endorsement dated within the 90 days preceding the date of flight, see #2. or #4., and a current logbook endorsement for Repeated SOLO Cross-Country Flights to another airport that is within 50 nm of the airport from which the flight originated, see #7., or a Specific SOLO Cross-Country Flight Planning endorsement that is flown on the date of the endorsement, see #10.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

9. SOLO Cross-Country Flight (Specific Make and Model Aircraft): 14 CFR §61.93(c)(2)(i) and (c)(e)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the maneuvers and procedures flight training specified in 14 CFR §61.93(c)(e)(1)–(12) in a –**[specify make and model aircraft]**–, and I have determined that the named pilot is proficient to conduct safe SOLO Cross-Country Flight in the described airplane.

NOTE: The above endorsement is only valid when accompanied by a **Student Pilot Certificate** - with a SOLO Cross-Country/Airplane Category endorsement, see #8., and a current SOLO Flight logbook endorsement dated within the 90 days preceding the date of flight, see #2. or #4., and a specific SOLO Cross-Country Flight Planning endorsement that is flown on the date of the endorsement, see #10.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

10. SOLO Cross-Country Flight – Each Trip Planning: 14 CFR §61.93(c)(2)(ii) and (d)

This is to certify that I have determined that the SOLO Cross-Country flight planning and preparation of –**[Pilot Name]**– as specified in 14 CFR §61.93(d) is correct for the flight from –**[names of applicable airports]**–, and that I have reviewed the current and forecast weather conditions and have determined that the flight will be completed under VFR, and I have determined that the named pilot has the required, appropriate, and current **Student Pilot Certificate**, and Logbook Endorsements for a –**[specify make and model aircraft]**– to be flown, and is proficient to conduct this SOLO Cross-Country flight safely under the known conditions.

NOTE: (1) The endorsing flight instructor may subject this flight authorization to stipulated limitations that the pilot must adhere to in accordance with 14 CFR §§61.89(8), and 61.93(c)(2)(ii)(C).
(2) The endorsing flight instructor must verify that the Student Pilot has the appropriate endorsements on the **Student Pilot Certificate**, first for SOLO Flight –[specify make and model aircraft]–, see #3., and second, for SOLO Cross-Country (Aircraft Category), see #8., and a current Logbook SOLO Flight Endorsement dated within the preceding 90 days for the (specific make and model aircraft), see #2. or #4., and an appropriate SOLO Cross-Country Flight endorsement for the (specific make ⧫

and model aircraft) to be flown on this SOLO Cross-Country Flight, see #9.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

11. SOLO Flight In Specific Class B Airspace: 14 CFR §61.95(a)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the ground and flight training required by 14 CFR §61.95(a)(1), the flight training was conducted in the –**[specific name of Class B Airspace]**–, and I find the named pilot proficient to conduct SOLO Flight therein.

NOTE: The above endorsement is only valid for SOLO Flights conducted within 90 days subsequent to the date of this endorsement.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

12. SOLO Flight To, From, or At A Specific Airport Located Within Class B Airspace: 14 CFR §§61.95(b), and 91.131(b)(1)(ii)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the flight training required by 14 CFR §61.95(b)(1), and find the named pilot proficient to conduct SOLO Flight operations at –**[name of specific airport]**–, within –**[name of Class B Airspace]**–.

NOTE: The above endorsement is only valid for SOLO Flights conducted within 90 days subsequent to the date of this endorsement.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

Recreational Pilot Endorsements

13. Aeronautical Knowledge Test (Written Examination): 14 CFR §§61.96(b)(3), and 61.97(a) and (b)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the Ground Training on the Aeronautical Knowledge Areas listed in 14 CFR §61.97(b)(1) through (12), and I certify that the named pilot is prepared for the required knowledge test for Recreational Pilot Certificate. – **Or** – This is to certify that –**[Pilot Name]**– has completed a Home-Study training course on the Aeronautical Knowledge Areas listed in 14 CFR §61.97(b)(1) through (12), and I certify that the named pilot is prepared for the required knowledge test for Recreational Pilot Certificate.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

14. Flight Proficiency–Practical Test: 14 CFR §§61.96(b)(5), 61.98(b), and 61.99

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the Flight Training on the areas of operation listed in 14 CFR §61.98(b) that apply to –**[specify aircraft category and class rating]**–, and I find that the named pilot is prepared for the required Practical Test for Recreational Pilot, and has satisfactory knowledge of the subject area(s) in which a deficiency was indicated by the Airman Knowledge Test Report.

NOTE: If the above named pilot does not take the Practical Test within 60 days of this endorsement, the ◗

pilot applicant is required to complete additional flight training in accordance with 14 CFR §61.39(a), see #39.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

15. Recreational PIC Flight Within 50 nm From The Departure Airport: 14 CFR §61.101(b)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the Ground and Flight Training required by 14 CFR §61.101(b)(1) through (4) at –**[name of departure airport]**– in a –**[specify aircraft category and class]**–.

NOTE: The named pilot must have personal possession of their logbook with the above endorsement when operating the aircraft.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

16. Recreational PIC Cross-Country Flight That Exceeds 50 nm From Departure Airport: 14 CFR §61.101(c)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the Cross-Country ground and flight training required by 14 CFR Part 61, Subpart E, §61.93 that apply to the aircraft rating held, and find that the named pilot is proficient to conduct PIC Cross-Country Flights in a –**[specify-make and model aircraft]**–.

NOTE: The named pilot must have personal possession of their logbook with the above endorsement when operating the aircraft. The endorsing flight instructor may subject this flight authorization to stipulated limitations that the pilot must adhere to in accordance with 14 CFR §§61.89(8), and 61.93(c)(2)(ii)(C).

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

17. Less Than 400 Flight Hours Logged, and Has Not Logged PIC Time Within The Preceding 180 Days: 14 CFR §61.101(f)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged evaluation and review flight instruction in a –**[specify make and model aircraft]**–, and I certify that the named pilot is proficient to act as PIC of the described aircraft.

NOTE: The requirements for this endorsement can be met in combination with the requirements of 14 CFR §§61.56 (Flight Review) and 61.57 (Recent Flight Experience: Pilot In Command) at the discretion of the flight instructor.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

18. SOLO Flights For Additional Certificate or Rating While Under The Supervision Of A CFI: 14 CFR §61.101(h) and (i)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the applicable ground and flight training required by 14 CFR §61.87 in a –**[specify make and model aircraft]**–, in which SOLO Flight is to be made. I find that the named pilot meets the aeronautical knowledge and flight training requirements, and has demonstrated satisfactory proficiency and safety, on the ➧

maneuvers and procedures required by 14 CFR §61.87(d), and is proficient to conduct a SOLO Flight on –**[date]**– in accordance with the logbook endorsement(s), and that endorsed logbook must be in the personal possession of the pilot while conducting this authorized SOLO Flight operation.

NOTE: (1) The endorsing flight instructor should subject this flight authorization to stipulated limitations that the pilot must adhere to in accordance with 14 CFR §61.101(I).
(2) The instructor must verify that the pilot has received all the required and appropriate training, and has received the corresponding current endorsements consistent with flight within airspace that requires communication with air traffic control, or between sunset and sunrise, provided the flight or surface visibility is at least 5 statute miles, in the make and model of aircraft in which the SOLO Flight is to be approved.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

Private Pilot Endorsements

19. Aeronautical Knowledge Test (Written Examination): 14 CFR §§61.103(d)(1), and 61.105

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the Ground Training on the Aeronautical Knowledge Areas listed in 14 CFR §61.105(b)(1) through (13), and I certify that the named pilot is prepared for the required knowledge test for Private Pilot Certificate. –**Or** – This is to certify that –**[Pilot Name]**– has completed a Home-Study training course on the Aeronautical Knowledge Areas listed in 14 CFR §61.105(b)(1) through (13), and I certify that the named pilot is prepared for the required knowledge test for Private Pilot Certificate.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

20. Flight Proficiency–Practical Test: 14 CFR §§61.103(f), and 61.107(b)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the flight training on the areas of operation listed in 14 CFR §61.107(b) that apply to –**[specify aircraft category and class rating]**–, and I find that the named pilot is prepared for the required Practical Test for Private Pilot, and has satisfactory knowledge of the subject area(s) in which a deficiency was indicated by the Airman Knowledge Test Report.

NOTE: If the above named pilot does not take the Practical Test within 60 days of this endorsement, the pilot applicant is required to complete additional flight training in accordance with 14 CFR §61.39(a), see #39.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

Commercial Pilot Endorsements

21. Aeronautical Knowledge Test (Written Examination): 14 CFR §§61.123(c), and 61.125

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the Ground Training on the Aeronautical Knowledge Areas listed in 14 CFR §61.125(b)(1) through (16), and I certify that the named pilot is prepared for the required knowledge test for Commercial Pilot Certificate. – **Or** – This is to certify that –**[Pilot Name]**– has completed a Home-Study training course on the Aeronautical Knowledge Areas listed in 14 CFR §61.125(b)(1) through (16), and I certify that the named pilot ♦

is prepared for the required knowledge test for Commercial Pilot Certificate.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

22. Flight Proficiency–Practical Test: 14 CFR §§61.123(e), 61.127(b), and 61.29(a)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the Flight Training on the Areas of Operation listed in 14 CFR §61.127(b) that apply to –**[specify aircraft category and class rating]**–, and I find that the named pilot meets the Aeronautical Experience required by 14 CFR §61.129(a), and has satisfactory knowledge of the subject area(s) in which a deficiency was indicated by the Airman Knowledge Test Report, and is prepared for the required Practical Test for Commercial Pilot.

NOTE: If the above named pilot does not take the Practical Test within 60 days of this endorsement, the pilot applicant is required to complete additional flight training in accordance with 14 CFR §61.39(a), see #39.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

Instrument Rating Endorsements

23. Aeronautical Knowledge Test (Written Examination): 14 CFR §§61.65(a)(3), and 61.65(b)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the Ground Training on the Aeronautical Knowledge Areas listed in 14 CFR §61.65(b)(1) through (10), and I certify that the named pilot is prepared for the required knowledge test for Instrument Rating. –**Or** – This is to certify that –**[Pilot Name]**– has completed a Home-Study training course on the Aeronautical Knowledge Areas listed in 14 CFR §61.65(b)(1) through (10), and I certify that the named pilot is prepared for the required knowledge test for Instrument Rating.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

24. Flight Proficiency–Practical Test: 14 CFR §§61.65(a)(5) and (6), and 61.65(c) and (d)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the flight training on the Areas of Operation listed in 14 CFR §61.65(c)(1)–(8) in a –**[specify aircraft, and/or flight simulator, and/or flight training device]**–. I find that the named pilot meets the Aeronautical Experience required by 14 CFR §61.65(d), and is prepared for the required Practical Test for Instrument –**[specify airplane]**– Rating, and has satisfactory knowledge of the subject area(s) in which a deficiency was indicated by the Airman Knowledge Test Report.

NOTE: (1) If the above named pilot does not take the Practical Test within 60 days of this endorsement, the pilot applicant is required to complete additional flight training in accordance with 14 CFR §61.39(a), see #39.
(2) The pilot applicant must demonstrate all of the instrument approach procedures required by 14 CFR Part 61. At least one instrument approach procedure must be demonstrated in an airplane or helicopter, as appropriate. At the discretion of the examiner, the instrument approach(es) and missed approach(es) not selected for actual flight demonstration may be performed in a flight simulator or training device that meets the requirements of the FAA.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

Flight Instructor Endorsements

25. Fundamentals Of Instruction (Written Examination): 14 CFR §§61.183(d), and 61.185(a)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the Ground Training on the Fundamentals Of Instruction listed in 14 CFR §61.185(a)(1)(i) through (vi), and I certify that the named pilot is prepared for the required knowledge test for Fundamentals Of Instruction.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

26. Aeronautical Knowledge Test (Written Examination): 14 CFR §§61.65(a)(3), 61.183(f), and 61.185(a)(2) or (3)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the ground training on the Aeronautical Knowledge Areas for Recreational, Private, and Commercial pilot or Instrument Rating applicable to the –**[specify aircraft category]**– for which flight instructor privileges are sought as required by 14 CFR §61.185(a)(2), and I certify that the named pilot is prepared for the required knowledge test for Flight Instructor –**[specify aircraft category and class rating]**– or –**[Instrument Rating]**–.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

27. Flight Proficiency–Practical Test: 14 CFR §§61.183(g), and 61.187(b)(2) or 61.187(b)(7)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the flight and ground training on the Areas of Operation listed in 14 CFR §61.187(b) that apply to –**[specify aircraft category and class rating]**–, and I find that the named pilot is proficient to pass the required Practical Test for Flight Instructor –**[specify aircraft category and class rating]**– **or** –**[Instrument Rating]**–, and has satisfactory knowledge of the subject area(s) in which a deficiency was indicated by the Airman Knowledge Test Report.

NOTE: If the above named pilot does not take the Practical Test within 60 days of this endorsement, the pilot applicant is required to complete additional flight training in accordance with 14 CFR §61.39(a), see #39.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

28. Spin Training: 14 CFR §61.183(i)(1) and (2)

This is to certify that I have given, and that –**[Pilot Name]**– has received flight training in spin entry, spins, and spin recovery procedures, and the named pilot has demonstrated instructional proficiency in spin entry, spins, and spin recovery procedures in both right and left turns. I find that the named pilot is competent and possesses instructional proficiency in the above maneuvers and procedures in a –**[specify aircraft category]**–.

Note: The above spin training endorsement is required of (Flight Instructor-Airplane) and (Flight Instructor-Glider) applicants only.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

Ground Instructor Endorsements

29. Fundamentals Of Instruction (Written Examination): 14 CFR §61.213(a)(3)

This is to certify that I have given, and that –[**Applicants Name**]– has received and logged the ground training on the Fundamentals Of Instruction listed in 14 CFR §61.213(a)(3)(i)–(vi), and I certify that the above named is prepared for the required knowledge test for Fundamentals Of Instruction.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

30. Aeronautical Knowledge Test – Basic Ground Instructor Rating (Written Examination): 14 CFR §§61.35(a)(1), 61.215(a)(1), 61.97, and 61.105

This is to certify that I have given, and that –[**Applicants Name**]– has received and logged the ground training in the Aeronautical Knowledge Areas required for issuance of a Recreational Pilot Certificate, Private Pilot Certificate, or associated ratings applicable to §61.215(a)(1). I certify that the above named is prepared for the required knowledge test for Basic Ground Instructor.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

31. Aeronautical Knowledge Test – Advanced Ground Instructor Rating (Written Examination): 14 CFR §§61.35(a)(1), 61.215(b)(1), 61.97, 61.105, and 61.125

This is to certify that I have given, and that –[**Applicants Name**]– has received and logged the ground training in the Aeronautical Knowledge Areas specified in §61.215(b)(1). I certify that the above named is prepared for the required knowledge test for Advanced Ground Instructor.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

32. Aeronautical Knowledge Test – Instrument Ground Instructor Rating (Written Examination): 14 CFR §§61.35(a)(1), 61.215(c)(1), and 61.65(b)

This is to certify that I have given, and that –[**Applicants Name**]– has received and logged the ground training in the Aeronautical Knowledge Areas specified in §61.215(c)(1). I certify that the above named is prepared for the required knowledge test for Instrument Ground Instructor.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

Additional and Miscellaneous Endorsements

33. Additional Aircraft Rating–Practical Test (Other Than ATP): 14 CFR §§61.39, and 61.63

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged the required training and possesses the aeronautical experience prescribed by 14 CFR Part 61 that applies to the –**[certificate type]**– pilot certificate for the –**[specify aircraft category and/or class]**– rating, and I find that the named pilot is competent in the aeronautical knowledge areas, and has demonstrated proficiency on the areas of operation that are appropriate to the above described pilot certificate and aircraft, and I find that the named pilot is prepared for the required Practical Test for –**[certificate type]**– Pilot, for the addition of –**[specify aircraft category and/or class]**– rating.

NOTE: (1) If the above named pilot does not take the Practical Test within 60 days of this endorsement, the pilot applicant is required to complete additional flight training in accordance with 14 CFR §61.39(a), see #39.
(2) The pilot applicant need not take an additional knowledge test, provided the applicant holds an airplane, rotorcraft, powered-lift, or airship rating at that pilot certificate level.
(3) The detailed information regarding the Areas of Operation/Task of the practical test for additional class ratings may be found in the appropriate Practical Test Standards (PTS).

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

34. Complex Airplane PIC: 14 CFR §61.31(e)

This is to certify that I have given, and that –**[Pilot Name]**– holder of –**[certificate type]**– pilot certificate # –[number]– has received and logged the ground and flight training in a –**[complex airplane or flight simulator or flight training device]**–, as required by 14 CFR §61.31(e), and I find the named pilot proficient to operate a Complex Airplane.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

35. Flight Review (BFR) Completion: 14 CFR §61.56(a) and (c)(1) and (2)

This is to certify that I have given, and that –**[Pilot Name]**– holder of –**[certificate type]**– pilot certificate # –**[number]**– has satisfactorily completed a Biennial Flight Review (BFR) required by 14 CFR §61.56(1) consisting of –**[hour(s)]**– of ground training and –**[hour(s)]**– of flight training on –**[date]**–.

NOTE: No logbook entry reflecting unsatisfactory performance on a flight review is required.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

36. High Altitudes (Ground Training) For Flight Above 25,000 feet MSL: 14 CFR §61.31(g)(1)

This is to certify that I have given, and that –**[Pilot Name]**– holder of –**[certificate type]**– pilot certificate # –**[number]**– has received and logged the ground training specified in §61.31(g)(1)(i) through (ix) for the operation of pressurized aircraft above 25,000 feet MSL.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

37. High Performance Airplane PIC: 14 CFR §61.31(f)

This is to certify that I have given, and that –**[Pilot Name]**– holder of –**[certificate type]**– pilot certificate # –**[number]**– has received and logged the ground and flight training in a –**[high performance airplane or flight simulator or flight training device]**–, as required by 14 CFR §61.31(f)(1)(i) and (ii), and I find the named pilot proficient to operate a High Performance Airplane.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

38. Instrument Proficiency Check (Recent Flight Experience): 14 CFR §61.57(d)

This is to certify that I have given, and that –**[Pilot Name]**– holder of –**[certificate type]**– pilot certificate # –**[number]**– has satisfactorily completed an Instrument Proficiency Check on –**[date]**–.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

39. Practical Test Prerequisites (Within 60 Days Of Test): 14 CFR §61.39(a)

This is to certify that I have given, and that –**[Pilot Name]**– has received and logged training time in preparation for the required practical test for a –**[name of pilot certificate or rating sought]**–, and is prepared for that test. The named pilot has satisfactorily accomplished the required training and obtained the aeronautical experience prescribed by 14 CFR Part 61 for the above certificate or rating sought, and has demonstrated satisfactory knowledge of the subject areas in which the pilot applicant was deficient on the Airman Knowledge Test.

NOTE: The instructor's signature in the endorsement block on the reverse side of FAA Form 8710-1, Airman Certificate and/or Rating Application, will be accepted in lieu of the above endorsement provided all appropriate 14 CFR Part 61 requirements are substantiated by reliable records, such as endorsements number 14, 20, 22, 24, and 27. However, the above endorsement without the instructor's signature in the endorsement block of FAA form 8710-1 is not acceptable.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

40. Pressurized Aircraft (Flight Training): 14 CFR §61.31(g)(2)

This is to certify that I have given, and that –**[Pilot Name]**– holder of –**[certificate type]**– pilot certificate # –**[number]**– has received and logged the flight training in a –**[pressurized aircraft or flight simulator or flight training device]**– required by §61.31(g)(2)(i) through (iii) and is proficient in the operation of a Pressurized Aircraft.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

41. Retesting After Failure Of A Knowledge Or Practical Test: 14 CFR §61.49

This is to certify that I have given, and that –**[Pilot Name]**– has received the necessary and additional training required by 14 CFR §61.49(1) and I have determined that the named pilot is proficient to pass the –**[name of the knowledge or practical]**– test.

NOTE: (1) The instructor may also complete the endorsement in the space provided at the bottom of the ➧

applicant's Airman Written Test Report in the case of a first failure on a written test.

(2) The instructor must sign the block provided for the instructor's endorsement on the reverse side of FAA Form 8710-1 for each retake of a practical test. An applicant may retake either a written or practical test after a failure if he or she has received additional instruction and an authorized instructor's endorsement.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

42. SOLO PIC Of An Aircraft Without Appropriate Category/Class Rating: 14 CFR §61.31(d)(3)

This is to certify that I have given, and that –**[Pilot Name]**– has received the appropriate flight training for SOLO Flight in a(n) –**[category and class and (type rating if required)]**– aircraft as required by 14 CFR §61.31(d) and find the named pilot proficient to SOLO the above specified aircraft.

NOTE: The instructor may want to stipulate additional conditions in the above endorsement.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

43. Tailwheel Airplane PIC: 14 CFR §61.31(i)

This is to certify that I have given, and that –**[Pilot Name]**– holder of –**[certificate type]**– pilot certificate # –**[number]**– has received and logged flight training in normal and crosswind takeoffs and landings, wheel landings (if appropriate), and go-around procedures in a tailwheel airplane as required by 14 CFR §61.31(i) and is proficient to act as PIC in Tailwheel Airplanes.

NOTE: If a pilot has logged pilot-in-command time in a tailwheel airplane before April 15, 1991, this endorsement is not required.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

44. Type-Specific Training (Airplane) - To Act As PIC: 14 CFR §61.31(h)

This is to certify that I have given, and that –**[Pilot Name]**– holder of –**[certificate type]**– pilot certificate # –**[number]**– has received and logged the Type Specific training required by 14 CFR §61.31(h)(1) and is proficient to operate –**[specify make and model aircraft]**– and its systems.

[Current Date] Edwin Quinlan [CFI Signature] Certificate No. Exp. dd/mm/yy

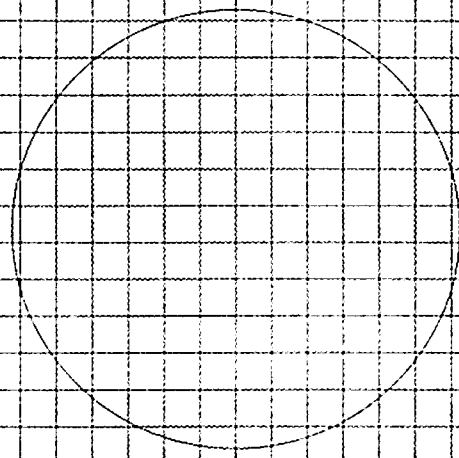
Flight Instructor's Responsibility

Editor's Note

An authorized FAA Certificated instructor "is responsible" for training the pilot applicant to the standards as outlined in the objective of each TASK within the appropriate pilot Practical Test Standard (PTS), and to determine and ensure that the pilot applicant has in fact completed all the prerequisite training prescribed by Title 14 of the Code of Federal Regulations, (14 CFR) Part 61 and 91 commonly referred to by the FAA as Federal Aviation Regulations (FAR). All referenced regulations herein should be verified for currency and applicability. Further the flight instructor must certify that the pilot applicant is able to perform safely as a pilot, and is proficient to pass the practical test if required for the certificate or rating sought.

Aviators Publishing - Ed Quinlan

Flight Notes



U.S. Department
of Transportation

Federal Aviation Administration

Advisory Circular

Subject: **ROLE OF PREFLIGHT PREPARATION** Date: **3-18-85** AC No: **61-84B**
Initiated by: **AFO-840**

1. **PURPOSE.** This advisory circular (AC) modifies and updates the flight information available to pilots as a result of changes in the basic Airmen Information Manual format.

2. **CANCELLATION.** AC 61-84A dated December 1, 1980, is canceled.

3. **BACKGROUND.**

a. One of the most often neglected acts of a pilot contemplating flight in an aircraft is that of proper preflight planning. While the reasons remain obscure, the facts are well supported by aircraft accident statistics. Although the number of general aviation accidents has shown a downward trend in recent years, the accident and fatality/serious injury statistics indicate an increase in the percentage of accidents during takeoff.

b. Statistics taken from the National Transportation Safety Board files show that from 1979 through 1983, 728 persons died and 665 were seriously injured in 4,291 takeoff accidents. These accidents are significant to general aviation pilots - annually, they represent about 20 percent of all general aviation accidents and about 16 percent of all fatalities and serious injuries. Traditionally, pilots have emphasized the planning of the en route and approach/landing phases of flight; e.g., the route to be taken, en route and destination weather, en route and terminal facilities, applicable altitudes and fuel requirements. Accident data, however, indicate that too little preparation is made for the actual takeoff of the aircraft. In order for pilots to fulfill their responsibilities to ensure the safety of the entire flight, it is necessary that they have knowledge of elements involved in preflight planning. It is also necessary they they take time to analyze the conditions and study the various factors which would affect the takeoff, en route, and landing phases of flight.

4. **KEY ELEMENTS OF PREFLIGHT PLANNING.**

a. **Charts.**

(1) A basic element of preflight preparation requires the use of current navigational charts on which pilots can mentally review their intended route of flight. They may or may not wish to draw a line on the chart representing the **true course.** They should, however, review the projected path across the face of the chart for the location of good checkpoints, restricted areas, obstructions, other flight hazards, and suitable airports. For visual flight rule (VFR) pilot planning by either pilotage or dead reckoning, the Sectional Aeronautical Chart is an excellent choice. It is scaled at 1/500,000, or 8 miles to the inch. The physical characteristics of most landmarks, both cultural and geographic, are shown in great detail. The pilot should have little difficulty identifying the selected landmarks along the route of flight. Another popular chart is the World Aeronautical Chart (WAC). The scale of the WAC is 1/1,000,000, or 16 miles to the inch. Many states print aeronautical charts which are excellent for VFR navigation within their state boundaries. The pilot should realize, however, that all of these charts are designed primarily for VFR navigation and contain only limited information concerning radio aids and frequencies. The use of instrument flight rules (IFR) navigational charts for planning pilotage or dead reckoning VFR flights is not desirable for the following reasons:

(i) Many airports used by the VFR pilot are not depicted or listed on the IFR charts.

(ii) Very few geographic or cultural landmarks are provided.

(iii) The pilot should refer to the **Aeronautical Information Manual - Basic flight Information and Air Traffic Control Procedures (AIM)** - for more precise coverage of this information.

(2) Most pilots are reluctant to admit to being disoriented or lost. Being lost can be an embarrassing and sometimes frightening experience. Pilots should carry appropriate and current aeronautical charts on all cross-country flights. The use of outdated charts may result in flights into airport traffic areas, control zones, or other restricted airspace without proper authorization. Having available the information contained in current charts will enhance the pilot's ability to complete the flight with greater confidence, ease, and safety.

b. Route. Since the shortest distance between two points is a straight line, a majority of pilots desire direct routes for most flights. Quite often there are factors that should be considered that may make a direct flight undesirable. Restricted and prohibited areas present obstacles to direct flights. In single-engine aircraft, pilots should give consideration to circumnavigating large, desolate areas. Pilots should also consider the single-engine service ceiling of multiengine aircraft when operating over high altitude terrain since the terrain elevation may be higher than the single-engine service ceiling of the multiengine aircraft being flown. An example of this is a multiengine aircraft with a single-engine service ceiling of 6,000 feet being flown over terrain of 9,000 feet elevation. Pilots should be aware that the only advantage they may have over a pilot flying a single-engine aircraft may be a wider latitude in selecting a suitable forced landing area.

c. Aeronautical Information Manual – Basic Flight Information and Air Traffic Control Procedures (AIM). Part 91 of the Federal Aviation Regulations (FAR) states, in part, that each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight. The AIM contains information concerning cross-country flight and basic fundamentals required for safe flight in the U.S. National Airspace System.

d. Airport/Facility Directory. The Airport/Facility Directory, published by the National Ocean Service, lists airports, seaplane bases, and heliports open to the public, communications data, navigational facilities, and certain special notices such as parachute jumping, Flight Service Station (FSS)/National Weather Service (NWS) telephone numbers, preferred routes, and aeronautical chart bulletins.

e. Notices to Airmen (Class II).

(1) Notices to Airmen (Class II) is issued biweekly and is divided into two sections. The first section contains those notices which are expected to remain in effect for at least 7 days after the effective date of the publication. National Flight Data Center (FDC) Notices to Airman (NOTAMS) primarily reflect changes to standard instrument approach procedures. FDC NOTAMS also establish flight restrictions and correct data on aeronautical charts.

(2) The second section contains special notices that, either because they are too long or because they concern a wide or unspecified geographical area, are not suitable for inclusion in the first section. The content of these notices vary widely and there are no specific criteria for inclusion, other than their enhancement of flight safety.

f. Notices to Airmen (NOTAM). In addition to NOTAM information contained in the Notices to Airman (Class II) publication, pilots should check with the nearest FSS for an update on the latest NOTAMS.

g. International Flight Information Manual. The International Flight Information Manual is published quarterly for use of private flyers, businessmen, and nonscheduled operators as a preflight and planning guide for flights outside the United States.

h. International Notices to Airman.

(1) The International Notices to Airmen is a biweekly publication containing significant international NOTAM information and special notices which may affect a pilot's decision to enter or use certain areas of foreign or international airspace.

(2) Pilots should avail themselves of all appropriate charts and publications, including the AIM and NOTAMS.

i. Weather. A weather briefing is an important part of preflight planning. An overview of the synoptic situation and general weather conditions can be obtained from public media (radio,TV, etc.) or by telephone from recorded sources. This will help the pilot to better understand the overall weather picture when obtaining a complete briefing from the FSS, NWS, or other organization that provides this service. Information on public media and recorded weather sources is contained in the Meteorology chapter of the AIM. This chapter also provides information on how to obtain a complete weather briefing, what to look for, and what to ask of the briefer to ensure that the pilot has all the weather necessary for the flight. The weather information should be weighed very carefully in considering the go/no-go decision. This decision is the sole responsibility of the pilot and compulsion should never take the place of good judgment.

j. Navigation Log. Precise flight planning of log items, such as pre-computed courses, time and distance, navigational aids, and frequencies to be used will make en route errors in these items less likely. Special attention should be given to fuel requirements, keeping in mind the need for an ample reserve as well as location of refueling points available as the flight progresses.

k. Flight Plan (VFR). This is not required by FAR, but is dictated by good operating practice. A flight plan not only assures prompt search and rescue in the event the aircraft becomes overdue or missing, but it also permits the destination station to render better service by having prior knowledge of your flight. It costs only a few minutes of time to file a flight plan and may be the best investment a pilot ever makes.

l. Aircraft Manual. Aircraft manuals contain operating limitations, performance, normal and emergency procedures, and a variety of other operational information for the respective aircraft. Traditionally, aircraft manufacturers have done considerable testing to gather and substantiate the information in the aircraft manual. Pilots should become familiar with the manual and be able to refer to it for information relative to a proposed flight.

5. KEY ELEMENTS DURING TAKEOFF PHASE. The importance of thorough preflight preparation which considers possible hazards to takeoff cannot be over-emphasized. The following elements, which should be carefully considered, continue to emerge as factors in takeoff accidents:

a. Gross Weight.

(1) Maximum allowable gross weight is established for an aircraft as an operating limitation for both safety and performance considerations. The gross weight is important because it is a basis for determining the takeoff distance. If gross weight increases, the takeoff speed must be greater to produce the greater lift required for takeoff. The takeoff distance varies with the square of the gross weight. As an example, for an aircraft with a relatively high thrust-to-weight ratio, **a 10 percent increase in takeoff gross weight would cause:**

(i) **a 5 percent increase in speed necessary for takeoff velocity;**
(ii) **at least a 9 percent decrease in acceleration; and,**
(iii) **at least a 21 percent increase in takeoff distance.**

NOTE: For aircraft with relatively low thrust-to-weight ratios, the figures are slightly higher.

(2) Operations within the proper gross weight limits are outlined in each operator's manual. Gross weight and center of gravity (CG) limits should be considered during preflight preparation. Weight in excess of the maximum certificated gross weight may be a contributing factor to an accident, especially when coupled with other factors which adversely affect

the ability of an aircraft to take off and climb safely. These factors may range from field elevation of the airport to the condition of the runway. The responsibility for considering these factors before each flight rests with the pilot.

b. Balance.

(1) A pilot must not only determine the takeoff weight of the aircraft, but also must assure that the load is arranged to fall within the allowable CG limits for the aircraft. Each aircraft manual provides instructions on the proper method for determining if the aircraft loading meets the balance requirements. The pilot should routinely determine the balance of the aircraft since it is possible to be within the gross weight limits and still exceed the CG limits.

(2) An airplane which exceeds the forward CG limits places heavy loads on the nosewheel and, in conventional landing gear airplanes, may, during braking, cause an uncontrollable condition. Furthermore, performance may be significantly decreased and the stall speed may be much higher.

(3) An airplane loaded in a manner that the CG exceeds the aft limit will have decreased static and dynamic longitudinal stability. This condition can produce sudden and violent stall characteristics and can seriously affect recovery.

(4) Pilots exceeding CG limits in helicopters may experience insufficient cyclic controls to safely control the helicopter. This can be extremely critical while hovering downwind with the helicopter load exceeding the forward CG limit.

c. Ice and Frost.

(1) Ice or frost can affect the takeoff performance of an aircraft significantly. Pilots should never attempt takeoffs with any accumulation of ice or frost on their aircraft. Most pilots are aware of the hazards of ice on the wings of an aircraft. The effects of a hard frost are much more subtle. This is due to an increased roughness of the surface texture of the upper wing and may cause up to a 10 percent increase in the airplane stall speed. It may also require additional speed to produce the lift necessary to become airborne.

(2) Once airborne, the airplane could have an insufficient margin of airspeed above stall such that gusts or turning of the aircraft could result in a stall. Accumulation of ice or frost on helicopter rotor blades results in potential rotor blade stalls at slower forward air speeds. It could also result in an unbalanced rotor blade condition which could cause an uncontrollable vibration.

d. Density Altitude.

(1) Aircraft instruments are calibrated to be correct under one set of conditions. Standard conditions represent theoretical sea level conditions, 59 degrees Fahrenheit and 29.92 in Hg. As high elevations are reached, both temperature and pressure normally decrease. Thus, density altitude is determined by compensating for pressure and temperature variances from the standard conditions. A pilot must remember that as density altitude increases, there is a corresponding decrease in the power delivered by the engine and the propellers or rotor blades. For airplanes, this may cause the required takeoff roll to increase by up to 25 percent for every 1,000 feet of elevation above sea level. The most critical conditions of takeoff performance are the result of a combination of heavy loads, unfavorable runway conditions, winds, high temperatures, high airport elevations, and high humidity.

(2) The proper accounting for the pressure altitude (field elevation is a poor substitute) and temperature is mandatory for accurate prediction of takeoff data. The required information will be listed in the aircraft manual and should be consulted before each takeoff, especially if operating at a high density altitude or with a heavily loaded aircraft.

e. Effect of Wind.

(1) Every aircraft manual gives representative wind data and corresponding ground roll distances. A headwind which is 10 percent of the takeoff airspeed will reduce the no-wind takeoff distance by 19 percent. A tailwind which is 10 percent of the takeoff airspeed, however, will increase the no-wind takeoff distance by about 21 percent.

(2) Although this consideration is basic to a successful takeoff, the number of accidents involv-

ing the selection of the wrong runway for the existing wind and taking off into unfavorable wind conditions indicates a need for many pilots to reevaluate their preflight planning to ensure that the effect of wind is considered fully.

f. Runway Condition.

(1) There are more than 14,700 airports in the United States, each with runways having various surface compositions, slopes, and degrees of roughness. Takeoff acceleration is affected directly by the runway surface condition and, as a result, it must be a primary consideration during preflight planning.

(2) Most aircraft manuals list takeoff data for level, dry, hard-surfaced runways. The runway to be used, however, is not always hard-surfaced and level. Consequently, pilots must be aware of the effect of the slope or gradient of the runway, the composition of the runway, and the condition of its surface. Each of these can contribute to a failure to obtain/maintain a safe flying speed.

(3) The effective runway gradient is the maximum difference in the runway centerline elevation divided by the runway length. The FAA recognizes the effect of runway gradient on the takeoff roll of an aircraft and has published limits on the maximum gradients. For general aviation VFR airports the maximum longitudinal runway grade is 2 percent, and the longitudinal runway grade change is 2 percent maximum. Furthermore, the takeoff length for a runway must be increased an additional 20 percent for each 1 percent of change in effective gradient to a maximum allowable effective gradient change of 2 percent.

(4) Since the runway gradient has a direct bearing on the component weight of the aircraft, a runway gradient of 1 percent would provide a force component along the path of the aircraft which is 1 percent of gross weight. In the case of an upslope, the additional drag and rolling friction caused by a 1 percent upslope can result in a 2 percent to 4 percent increase in the takeoff distance and subsequent climb.

(5) Frequently, the only runway at an airport has a slope. When determining which direction to use for takeoff, pilots must remember that a direction uphill, but into a headwind, is generally preferred to a downwind takeoff on a downsloping runway. Factors such as steep slope, light wind, etc., however, make an uphill takeoff impractical.

(6) It is difficult to predict the retarding effect on the takeoff run that water, snow/slush, sand, gravel, mud, or long grass on a runway will have, but these factors can be critical to the success of a takeoff. Since the takeoff data in the aircraft manual is predicated on a dry, hard surface each pilot must develop individual guidelines for operations from other type surfaces.

g. Cold Weather Takeoffs. The following is an excerpt taken from AC 91-13C, Cold Weather Operation of Aircraft:

"Takeoffs in cold weather offer some distinct advantages, but they also offer special problems. A few points to remember are:

"(1) Do not boost supercharged or turbine engines. Use the applicable power charts for the pressure altitude and ambient temperature to determine the appropriate manifold pressure or engine pressure ratio. Care should be exercised in operating normally aspirated engines. Power output increases at about 1 percent for each ten degrees of temperature below that of standard air. At -40 degrees F, an engine might develop 10 percent more than rated power even though RPM and MP limits are not exceeded.

"(2) On multiengine aircraft it must be remembered that the critical engine out minimum control speed (Vmc) was determined at sea level with a standard day temperature. Therefore, Vmc will be higher than the published figure during a cold weather takeoff unless the power setting is adjusted to compensate for the lower density altitude.

"(3) With reciprocating engines, use carburetor heat as required. In some cases, it is necessary to use heat to vaporize the fuel. Gasoline does not vaporize readily at very cold temperatures. Do not use carburetor heat in such a manner that it raises the mixture temperature to freezing or just a little below. In such cases, it may be inducing carburetor icing. An accurate mixture temperature gauge is a good investment for cold weather operation. On some occasions

in extremely cold weather, it may be advisable to use carburetor heat on takeoff.

"(4) If icing conditions exist, use the anti-ice and deice equipment as outlined in the Airplane Flight Manual. If the aircraft is turbine powered, use the appropriate power charts for the condition, bearing in mind that the use of bleed air will, in most cases, affect the aircraft's performance."

6. **SUMMARY. Preflight preparation is the foundation of safe flying.** Accident statistics of recent years indicate that adequate preflight preparation is lacking in many cases. As a result, while the number of general aviation accidents and approach and landing accidents has declined, takeoff accidents have increased. Statistics indicate that takeoff accidents occur because elements of the preflight preparation were:

a. not assigned the proper importance,

b. not incorporated into the preflight routine, or

c. pilots did not anticipate potential takeoff emergencies and the required procedures to follow.

7. **RECOMMENDATION.** To enhance the safety of flying, pilots are encouraged to:

a. form good preflight planning habits and review them continually,

b. be thoroughly knowledgeable of the hazards and conditions which would represent potential dangers, particularly during takeoff, and,

c. be aware of the capabilities and limitations of their aircraft.

Editor's Recommendation

Flight instructors and pilot applicants should check the FAA Advisory Circular Checklist to determine if this AC is current; the most recent cited should be used. Additionally, any CFR's (Title 14 of the Code of Federal Regulations) formerly incorrectly referred to by the FAA as Federal Aviation Regulation(s) (FAR's), referenced herein should be verified for currency and applicability.

Aviators Publishing · Ed Quinlan

U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

Subject: USE OF DISTRACTIONS DURING PILOT CERTIFICATION FLIGHT TESTS

Date: 1-25-80 AC No: 61-92
Initiated by: AFO-590

1. PURPOSE. This advisory circular announces the Federal Aviation Administration's policy of incorporating into all flight tests the use of certain distractions during the performance of flight test maneuvers.

2. BACKGROUND.

a. According to the General Aviation Pilot Stall Awareness Study (Report No. FAA-RD-77-26), stall/spin related accidents accounted for about twenty-five percent of the total general aviation fatal accidents. National Transportation Safety Board statistics reveal that most stall/spin accidents occurred when the pilot's attention was diverted from the primary task of flying the aircraft. Sixty percent of stall/spin accidents occurred during takeoff or landing; and twenty percent were preceded by engine failure (a distraction) Other distractions included preoccupation inside or outside the cockpit while changing power, configuration or trim; maneuvering to avoid other traffic; or clearing hazardous obstacles during takeoff and climb.

b. The intentional practice of stalls and spins seldom resulted in an accident. The real danger was inadvertent stalls induced by distractions during routine flight situations.

3. DISCUSSION. In view of the data revealed by the Stall Awareness Study, the Federal Aviation Administration has established the use of certain distractions in conjunction with pilot certification flight tests. Distractions may be included in the evaluation of performance to determine that applicants possess the skills required to cope with distractions while maintaining the degree of aircraft control required for safe flight.

4. EXAMPLES OF DISTRACTIONS FOR A GIVEN MANEUVER. During an applicant's performance of "S" Turns Across A Road, the Federal Aviation Administration inspector or other authorized pilot examiner may observe and note performance while providing distractions such as requesting the applicant to:

a. Simulate radio communications.

b. Read outside air temperature gauge.

c. Remove object from the glove compartment.

d. Identify terrain features or objects on the ground.

e. Climb 200 feet and maintain altitude, then descend 200 feet and maintain altitude.

f. Reverse course after a series of "S" turns.

g. Identify fields suitable for forced landings.

5. SUMMARY. At the time for their next revision, all flight test guides will be changed to include distractions appropriate to selected fling maneuvers listed under pilot operations. During the interim, Federal Aviation Administration inspectors and designated pilot examiners may incorporate the use of realistic distractions during the performance of flight test maneuvers.

Kenneth S. Hunt
Director of Flight Operations

U.S. Department
of Transportation

Federal Aviation Administration

Advisory Circular

Subject: **PRESOLO WRITTEN TEST** Date: 4-21-89 AC No: 61-101
Initiated by: AFS-632

1. **PURPOSE.** To provide guidance to flight instructors in developing a written test to administer to student pilots prior to solo flights.

2. **REFERENCES.** Federal Aviation Regulation (FAR) Part 61 and Advisory Circular AC 60-14, Aviation Instructor's Handbook.

3. **BACKGROUND.** A revision of FAR Section 61.87(b) becomes effective August 31, 1989. This revision requires the satisfactory completion of a written test by student pilots prior to solo flight. The flight instructor who endorses the student pilot certificate for solo flight is required to administer and grade the written test prior to certificate endorsement.

4. **DISCUSSION.** FAR Section 61.87(b) states that the presolo written test must include questions applicable to FAR Parts 61 and 91 and on the flight characteristics and operational limitations of the make and model aircraft to be flown. The regulation allows the flight instructor the flexibility to develop a presolo written test which not only evaluates the student's knowledge on general operation rules, but on the specific environment in which the student will be operating and on the particular make and model of aircraft to be flown.

Prior to developing a presolo written test a flight instructor should review chapter VII of AC 60-14 which discusses the development of written test questions.

The content and number of test questions are to be determined by the flight instructor. An adequate sampling of the general operating rules should be included. In addition, a sufficient number of specific questions should be asked to ensure the student has the knowledge to safely operate the aircraft in the local environment.

The regulation requires a presolo written test for each make and model of aircraft to be soloed. Because of the varying complexity of aircraft and operating environments, the flight instructor will have to use good judgment in developing the test. For instance, a student who would be operating from a controlled airport located near a terminal control area or airport radar service area should have adequate knowledge to operate safely in the environment prior to solo. Likewise, a student operating from a high elevation airport might need emphasis placed on the effects of density altitude. Specific questions should be asked to fit the situation.

In areas where specific knowledge is to be tested, it is suggested that supply-type test questions be used. This type of question requires the student to supply an answer and permits them to tell all they know about a subject even though they do not know the complete answer. The supply-type question, as opposed to the selection-type question, will allow the flight instructor to better evaluate the student's knowledge and understanding.

In preparation for the development of the written test, the flight instructor should review FAR Parts 61 and 91, consider the aircraft characteristics and operational performance and limitations, and evaluate the operational environment to which the student will be exposed. Once the flight instructor has made a determination of the knowledge needed to operate the aircraft safely for solo flight, a test should be constructed which will measure this knowledge.

Since a written test is required prior to solo flight, the flight instructors should keep a record of the written test results for at least 3 years. This record should include at least the date, name of the student, and the results of the test.

John M. Howard
Director, Aviation Standards
National Field Office

Notice of Supersession

Presolo Knowledge Test.

This Advisory Circular was superseded by the issuance of **FAA-H-8083-9, Aviation Instructor's Handbook**, and dated 1999, which has incorporated the subject "Presolo Knowledge Test" [6-13] into its contents. However, and in view of the fact that the above information remains applicable, this AC was not removed from this manual for the convenience of the reader.

Aviators Publishing · Ed Quinlan

Notice of Supersession

Positive Exchange of Flight Controls.

This Advisory Circular was superseded by the issuance of **FAA-H-8083-9, Aviation Instructor's Handbook**, and dated 1999, which has incorporated the subject "Positive Exchange of Flight Controls" [9-7] into its contents. However, and in view of the fact that the information on page 8.34 remains applicable, this AC was not removed from this manual for the convenience of the reader.

Aviators Publishing · Ed Quinlan

U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

Subject: POSITIVE EXCHANGE OF FLIGHT CONTROLS PROGRAM

Date: 3-10-95 AC No: 61-115

Initiated by: AFS-631

See Notice of Supersession on page 8.33

1. **PURPOSE.** This advisory circular provides guidance for all pilots, especially student pilot, flight instructors, and pilot examiners, on the recommended procedure to use for the positive exchange of flight controls between pilots when operating an aircraft.

2. **BACKGROUND.** Incident/accident statistics indicate a need to place additional emphasis on the procedure for exchange of control of an aircraft by pilots. Numerous accidents have occurred due to a lack of communication or misunderstanding as to who actually had control of the aircraft, particularly between students and flight instructors. Establishing this procedure during the initial training of students will ensure the formation of a habit pattern that should stay with them throughout their flying careers. They will be more likely to relinquish control willingly and promptly when instructed to do so during flight training.

3. **GENERAL.** During flight training, there must always be a clear understanding between students and flight instructors of who has control of the aircraft. Prior to flight, a briefing should be conducted that includes the procedure for the exchange of flight controls. A positive three-step process in the exchange of flight controls between pilots is a proven procedure and one that is strongly recommended.

When an instructor is teaching a maneuver to a student, the instructor will normally demonstrate the maneuver first, then have the student follow along on the controls during a demonstration and, finally, the student will perform the maneuver with the instructor following along on the controls. When the flight instructor wishes the student to take control of the aircraft, he/she says to the student, "You have the flight controls." The student acknowledges immediately by saying, "I have the flight controls." The flight instructor again says, "You have the flight controls." During this procedure, a visual check is recommended to see that the other person actually has the flight controls. When returning the controls to the instructor, the student should follow the same procedure the instructor used when giving control to the student. The student should stay on the controls and keep flying the aircraft until the instructor says, "I have the flight controls." There should never be any doubt as to who is flying the aircraft.

Flight instructors should always guard the controls and be prepared to take control of the aircraft. When necessary, the instructor should take the controls and CALMLY announce, **"I have the flight controls."** If an instructor allows a student to remain on the controls, the instructor may not have full and effective control of the aircraft. ANXIOUS students can be incredibly strong and usually exhibit reactions inappropriate to the situation. If a recovery is necessary, there is absolutely nothing to be gained by having the student on the controls and having to fight for control of the aircraft.

Pilot examiners should discuss this procedure with all pilot applicants prior to the flight portion of any practical test.

Students should never be allowed to exceed the flight instructor's or pilot examiner's limits. Flight instructors and pilot examiners should not exceed their own ability to perceive a problem, decide upon a course of action, and physically react within their ability to fly the aircraft.

William J. White
Deputy Director, Flight Standards Service

U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

Subject: TRAFFIC ADVISORY PRACTICES AT AIRPORTS WITHOUT OPERATING CONTROL TOWERS

Date: 5-21-90 AC No: 90-42F

Initiated by: ATP-230

1. **PURPOSE.** This advisory circular (AC) contains good operating practices and procedures for use when approaching or departing airports without an operating control tower and airports that have control towers operating part time. This AC has been updated to include changes in radio frequencies and phraseology.

2. **CANCELLATION.** Advisory Circular 90-42E, dated November 23, 1988, is cancelled.

3. **REFERENCES.** The following AC's also contain information applicable to operations at such uncontrolled airports.

a. AC 90-66, Recommended Standard Traffic Patterns for Aircraft Operations at Airports Without Operating Control Towers.

b. AC 150/5340-27A, Air-to-Ground Radio Control of Airport Lighting Systems.

4. **DEFINITIONS.**

a. **COMMON TRAFFIC ADVISORY FREQUENCY (CTAF)** - A designated frequency for the purpose of carrying out airport advisory practices while operating to or from an airport that does not have a control tower or an airport where the control tower is not operational. The CTAF is normally a UNICOM, MULTICOM, flight service station(FSS) frequency, or a tower frequency. CTAF will be identified in appropriate aeronautical publications.

b. **UNICOM** - A nongovernment air/ground radio communication station which may provide airport information at public use airports.

c. **MULTICOM** - A mobile service, not open to public correspondence use, used for essential communications in the conduct of activities performed by or directed from private aircraft.

d. **MOVEMENT AREA** - The runways, taxiways, and other areas of an airport/heliport which are utilized for taxiing/hover taxiing, air taxiing, takeoff and landing of aircraft, exclusive of loading ramps, and parking areas.

5. **DISCUSSION.**

a. In the interest of promoting safety, the Federal Aviation Administration, through its Aeronautical Information Manual, Airport Facility Directory, Advisory Circular, and other publications provides frequency information, good operating practices, and procedures for pilots to use when operating to and from an airport without an operating control tower.

b. There is no substitute for awareness while in the vicinity of an airport. It is essential that pilots remain alert and look for other traffic and exchange traffic information when approaching or departing an airport without the services of an operating control tower. This is of particular importance since other aircraft may not have communication capability or, in some cases, pilots may not communicate their presence or intentions when operating into or out of such airports. To achieve the greatest degree of safety, it is essential that all radio-equipped aircraft transmit/receive on a common frequency identified for the purpose of airport advisories.

c. The key to communicating at an airport

without an operating control tower is selection of the correct common frequency. The CTAF for each airport without an operating control tower is published in appropriate aeronautical information publications. The CTAF for a particular airport can also be obtained by contacting any FSS. Use of the appropriate CTAF, combined with visual alertness and application of the following recommended good operating practices, will enhance safety of flight into and out of all such airports.

d. There are two ways for pilots to communicate their intentions and obtain airport/traffic information when operating at an airport that does not have an operating tower: by communicating with an FSS that is providing airport advisories on a CTAF or by making a self-announced broadcast on the CTAF.

6. RECOMMENDED TRAFFIC ADVISORY PRACTICES. All inbound traffic should continuously monitor and communicate, as appropriate, on the designated CTAF from a point 10 miles from the airport until clear of the movement area. Departing aircraft should continuously monitor/communicate on the appropriate frequency from startup, during taxi, and until 10 miles from the airport unless the Federal Aviation Regulations or local procedures require otherwise.

7. AIRPORT ADVISORY SERVICE (AAS) PROVIDED BY AN FSS.

a. An FSS physically located on an airport may provide airport advisory service (AAS) at an airport that does not have a control tower or where a tower is operated on a part-time basis and the tower is not in operation. The CTAF's for FSS's which provide this service are published in appropriate aeronautical publications.

b. An FSS AAS provides pilots with wind direction and velocity, favored or designated runway, altimeter setting, known traffic, Notices to Airmen, airport taxi routes, airport traffic pattern, and instrument approach procedures information. Pilots may receive some or all of these elements depending on the current traffic situation. Some airport managers have specified that under certain wind or other conditions, designated runways are used. Therefore, pilots should advise the FSS of the runway they intend to use. It is important to note that not all aircraft in the vicinity of an airport may be in communication with the FSS.

c. In communication with an FSS on CTAF, establish two-way communications before transmitting outbound/inbound intentions or information. Inbound aircraft should initiate contact approximately 10 miles from the airport. Inbounds should report altitude, aircraft type, and location relative to the airport; should indicate whether landing or overflight; and should request airport advisory. Departing aircraft should, as soon as practicable after departure, contact the FSS and state the aircraft type, full identification number, type of flight planned; i.e., visual flight rules (VFR) or instrument flight rules (IFR), the planned destination or direction of flight, and the requested services desired. Pilots should report before taxiing, before entering the movement area, and before taxiing onto the runway for departure. If communication with a UNICOM is necessary, pilots should do so before entering the movement area or on a separate transceiver. It is essential that aircraft continuously monitor the CTAF within the specified area.

d. Examples of AAS phraseology:

(1) Inbound:

VERO BEACH RADIO, CENTURION SIX NINER DELTA DELTA ONE ZERO MILES SOUTH, TWO THOUSAND, LANDING VERO BEACH. REQUEST AIRPORT ADVISORY.

(2) Outbound:

VERO BEACH RADIO, CENTURION SIX NINER DELTA DELTA, READY TO TAXI, VFR, DEPARTING TO THE SOUTHWEST. REQUEST AIRPORT ADVISORY.

8. INFORMATION PROVIDED BY AERONAUTICAL ADVISORY STATIONS (UNICOM). Unicom stations may provide pilots, upon request, with weather information, wind direction, the recommended runway, or other necessary information. If the UNICOM frequency is designated as the CTAF, it will be identified in appropriate aeronautical publications. If wind and weather information are not available, it may be obtainable from nearby airports vs. Automatic Terminal Information Service or Automated Weather Observing System frequency.

9. SELF-ANNOUNCE POSITION AND/OR INTENTIONS.

a. General. "Self-announce" is a procedure

whereby pilots broadcast their position, intended flight activity or ground operation on the designated CTAF. This procedure is used primarily at airports which do not have a control tower or an FSS on the airport. The self-announce procedure should also be used when a pilot is unable to communicate with the local FSS on the designated CTAF.

b. If an airport has a control tower which is either temporarily closed or operated on a part-time basis and there is no operating FSS on the airport, pilots should use the published CTAF to self-announce position and/or intentions.

c. Where there is no tower, FSS, or UNICOM station on the airport, use MULTICOM frequency 122.9 for self-announce procedures. Such airports will be identified in appropriate aeronautical information publications.

d. Practice Approaches. Pilots conducting practice instrument approaches should be particularly alert for other aircraft that may be departing in the opposite direction. When conducting any practice approach, regardless of its direction relative to other airport operations, pilots should make announcements on the CTAF as follows:

(1) when departing the final approach fix, inbound;

(2) when established on the final approach segment or immediately upon being released by ATC;

(3) upon completion or termination of the approach; and

(4) upon executing the missed approach procedure.

NOTE: Departing aircraft should always be alert for arrival aircraft that are opposite direction.

10. UNICOM COMMUNICATION PROCEDURES.

a. In communicating with a UNICOM station, the following practices will help reduce frequency congestion, facilitate a better understanding of pilot intentions, help identify the location of aircraft in the traffic pattern, and enhance safety of flight:

(1) Select the correct CTAF frequency.

(2) State the identification of the UNICOM station you are calling in each transmission.

(3) Speak slowly and distinctly.

(4) Notify the UNICOM station approximately 10 miles from the airport, reporting altitude, aircraft type, aircraft identification, location relative to the airport, and whether landing or overflight. Request wind information and runway in use.

(5) Report on downwind, base, and final approach.

(6) Report leaving the runway.

b. Examples of UNICOM Phraseologies:

(1) Inbound:

FREDERICK UNICOM CESSNA EIGHT ZERO ONE TANGO FOXTROT 10 MILES SOUTHEAST DESCENDING THROUGH (ALTITUDE) LANDING FREDERICK, REQUEST WIND AND RUNWAY INFORMATION FREDERICK.

FREDERICK TRAFFIC CESSNA EIGHT ZERO ONE TANGO FOXTROT ENTERING DOWNWIND/BASE/FINAL (AS APPROPRIATE) FOR RUNWAY ONE NINE (FULL STOP/TOUCH-AND-GO) FREDERICK.

* FREDERICK TRAFFIC CESSNA EIGHT ZERO ONE TANGO FOXTROT CLEAR OF RUNWAY ONE NINE FREDERICK. *

(2) Outbound:

FREDERICK UNICOM CESSNA EIGHT ZERO ONE TANGO FOXTROT (LOCATION ON AIRPORT) TAXIING TO RUNWAY ONE NINE, REQUEST WIND AND TRAFFIC INFORMATION FREDERICK.

FREDERICK TRAFFIC CESSNA EIGHT ZERO ONE TANGO FOXTROT DEPARTING RUNWAY ONE NINE. "REMAINING IN THE PATTERN" OR "DEPARTING THE PATTERN TO THE (DIRECTION) (AS APPROPRIATE)" FREDERICK.

11. EXAMPLES OF SELF-ANNOUNCE PHRASEOLOGIES.

It should be noted that aircraft operating to or from another nearby airport may be making self-announce broadcasts on the same UNICOM or MULTICOM frequency. To help identify one airport from another, the airport name should be spoken at the beginning and end of each self-announce transmission.

(1) Inbound:

STRAWN TRAFFIC, APACHE TWO TWO FIVE ZULU,

(POSITION), (ALTITUDE), (DESCENDING) OR ENTERING DOWNWIND/BASE/FINAL (AS APPROPRIATE) RUNWAY ONE SEVEN FULL STOP, TOUCH-AND-GO, STRAWN.

* STRAWN TRAFFIC APACHE TWO TWO FIVE ZULU CLEAR OF RUNWAY ONE SEVEN STRAWN. *

(2) Outbound:

STRAWN TRAFFIC, QUEENAIRE SEVEN ONE FIVE FIVE BRAVO (LOCATION ON AIRPORT) TAXIING TO RUNWAY TWO SIX STRAWN.

STRAWN TRAFFIC, QUEENAIRE SEVEN ONE FIVE FIVE BRAVO DEPARTING RUNWAY TWO SIX. DEPARTING THE PATTERN TO THE (DIRECTION), CLIMBING TO (ALTITUDE) STRAWN.

(3) Practice Instrument Approach:

STRAWN TRAFFIC, CESSNA TWO ONE FOUR THREE QUEBEC (NAME-FINAL APPROACH FIX) INBOUND DESCENDING THROUGH (ALTITUDE) PRACTICE (TYPE) APPROACH RUNWAY THREE FIVE STRAWN.

STRAWN TRAFFIC, CESSNA TWO ONE FOUR THREE QUEBEC PRACTICE (TYPE) APPROACH COMPLETED OR TERMINATED RUNWAY THREE FIVE STRAWN.

COMMUNICATION/BROADCAST PROCEDURES

Facility At Airport	Frequency Use	Outbound	Inbound	Practice IFR App.
a. UNICOM(no Tower or FSS)	Communicate with UNICOM station on published CTAF frequency (122.7, 122.8, 122.725, 122.975, or 123.0). If unable to contact UNICOM station, use self-announce procedures on CTAF.	Before taxiing and before taxiing on the runway for departure	10 miles out, and entering downwind, base, and final, and leaving the runway	Departing final approach fix (name) inbound, and approach completed/ terminated
b. No Tower, FSS, or UNICOM	Self-announce on MULTICOM freq. 122.9			
c. No Tower in Operation, FSS Open	Communicate with FSS on CTAF			
d. FSS Closed (No Tower)	Self-announced on CTAF			
e. Tower Or FSS not in Operation	Self-announced on CTAF			

12. SUMMARY OF RECOMMENDED COMMUNICATIONS PROCEDURES.

13. IFR AIRCRAFT. When operating in accordance with an IFR clearance, if air traffic control (ATC) approves a change to the advisory frequency, change to and monitor the CTAF as soon as possible and follow the recommended traffic advisory procedures.

14. GROUND VEHICLE OPERATION. Drivers of airport ground vehicles equipped with radios should monitor the CTAF frequency when operating on the airport movement area and remain clear of runways/taxiways being used by aircraft. Radio transmissions from ground vehicles should be confined to safety-related matters.

15. **RADIO CONTROL OF AIRPORT LIGHTING SYSTEMS.** Whenever possible, the CTAF will be used to control airport lighting systems at airports without operating control towers. This eliminates the need for pilots to change frequencies to turn the lights on and allows a continuous listening watch on a single frequency. The CTAF is published on the instrument approach chart and in other appropriate aeronautical information publications. For further details concerning radio controlled lights, see AC 150/5340-27.

16. **DESIGNATED UNICOM/MULTICOM FREQUENCIES.** The following listing depicts appropriate UNICOM and MULTICOM frequency used as designated by the Federal Communications Commission (FCC).

Frequency	Use
122.700	Airports without an operating control tower
122.725	Airports without an operating control tower
122.750 *	Air-to-air communications & private airports (not open to the public) *
122.800	Airports without an operating control tower
122.900 *	(MULTICOM FREQUENCY) Activities of a temporary, seasonal, or emergency nature.
122.925	(MULTICOM FREQUENCY) Forestry managment and fire suppression, fish and game management and protection, and environmental monitoring and protection. *
122.950	Airports with control tower or FSS on airport
122.975	Airports without an operating control tower
123.000	Airports without an operating control tower
123.050	Airports without an operating control tower
123.075	Airports without an operating control tower

NOTE 1: In some areas of the country, frequency interference may be encountered from nearby airports using the same UNICOM frequency. Where there is a problem, UNICOM operators are encouraged to develop a "least interference" frequency assignment plan for airports concerned using the frequencies designated for airports without operating control towers.

*** UNICOM licensees are encouraged to apply for UNICOM 25 kHz spaced channel frequencies. Due to the extremely limited number of frequencies with 50kHz channel spacing, 25 kHz channel spacing should be implemented. UNICOM licensees may then request FCC to assign frequencies in accordance with the plan, which FCC will review and consider for approval.***

NOTE 2: Wind direction and runway information may not be available on UNICOM frequency 122.950.

17. **USE OF UNICOM FOR ATC PURPOSES. UNICOM SERVICE MAY BE USED FOR ATC PURPOSES,** only under the following circumstances:

a. Revision to proposed departure time.

b. Takeoff, arrival, or flight plan cancellation time.

c. ATC clearance, provided arrangements are made between the ATC facility and the UNICOM licensee to handle such messages.

18. **MISCELLANEOUS.** Operations at airports without operating control towers require the highest degree of vigilance on the part of pilots to see and avoid aircraft while operating to or from such airports. Pilots should stay alert at all times, anticipate the unexpected, use the published CTAF frequency, and follow recommended airport advisory practices.

Harold W. Becker
Acting Director, Air Traffic
Rules and Procedures Service

U.S. Department
of Transportation

Federal Aviation Administration

Advisory Circular

Subject: PILOTS' ROLE IN COLLISION AVOIDANCE | Date: 3-18-83 | Initiated by: AFO-820 | AC No: 90-48C

1. **PURPOSE.** This advisory circular is issued for the purpose of **alerting all pilots** to the potential hazards of **midair collision** and **near midair collision**, and to emphasize those basic problem areas related to the human causal factors where improvements in pilot education, operating practices, procedures, and improved scanning techniques are needed to reduce midair conflicts.

2. **CANCELLATION.** AC 90-48B, Pilots' Role in Collision Avoidance, dated 9/5/80 is canceled.

3. **BACKGROUND.**

a. From 1978 through October 1982 a total of 152 midair collisions (MAC) occurred in the United States resulting in 377 fatalities. Throughout this approximate 5-year time period the yearly statistics remained fairly constant, with a recorded high of 38 accidents in 1978 and a low of 25 in both 1980 and 1981. During this same time period there were 2,241 reported near midair collisions (NMAC). Statistics indicate that the majority of these midair collisions and near midair collisions, occurred in good weather and during the hours of daylight.

b. The FAA has introduced several significant programs designed to reduce the potential for midair and near midair collisions. This advisory circular is but one of those programs and is directed towards all pilots operating in the National Airspace System, with emphasis on the need for recognition of the human factors associated with midair conflicts.

4. **ACTION.** The following areas warrant special attention and continuing action on the part of all pilots to avoid the possibility of becoming involved in a midair conflict.

a. **"See and Avoid" Concept.**

(1) The flight rules prescribed in Part 91 of the Federal Aviation Regulations (FAR) set forth the concept of "See and Avoid." This concept requires that vigilance shall be maintained at all times, by each person operating an aircraft, regardless of whether the operation is conducted under Instrument Flight Rules (IFR) or Visual Flight Rules (VFR).

(2) Pilots should also keep in mind their responsibility for continuously maintaining a vigilant lookout **regardless** of the type of aircraft being flown. Remember that most MAC accidents and reported NMAC incidents occurred during good VFR weather conditions and during the hours of daylight.

b. **Visual Scanning.**

(1) Pilots should remain constantly alert to all traffic movement within their field of vision, as well as periodically scanning the entire visual field outside of their aircraft to ensure detection of conflicting traffic. Remember that the performance capabilities of many aircraft, in both speed and rates of climb/descent, result in high closure rates limiting the time available for detection, decision, and evasive action.

(2) The probability of spotting a potential collision threat increases with the time spent looking outside, but certain techniques may be used to increase the effectiveness of the scan time. The human eyes tend to focus somewhere, even in a featureless sky. In order to be most effective, the pilot should shift glances and refocus at intervals. Most pilots do this in the process of scanning the instrument panel, but it is also important to focus outside to set up the visual sys-

tem for effective target acquisition.

(3) Pilots should also realize that their eyes may require several seconds to refocus when switching views between items in the cockpit and distant objects. Proper scanning requires the constant sharing of attention with other piloting tasks, thus it is easily degraded by such psychophysiological conditions such as fatigue, boredom, illness, anxiety, or preoccupation.

(4) Effective scanning is accomplished with a series of short, regularly-spaced eye movements that bring successive areas of the sky into the central visual field. Each movement should not exceed 10 degrees, and each area should be observed for at least 1 second to enable detection. Although horizontal back-and-forth eye movements seem preferred by most pilots, each pilot should develop a scanning pattern that is most comfortable and then adhere to it to assure optimum scanning.

(5) Peripheral vision can be most useful in spotting collision threats from other aircraft. Each time a scan is stopped and the eyes are refocused, the peripheral vision takes on more importance because it is through this element that movement is detected. Apparent movement is almost always the first perception of a collision threat and probably the most important, because it is the discovery of a threat that triggers the events leading to proper evasive action. It is essential to remember, however, that if another aircraft appears to have no relative motion, it is likely to be on a collision course with you. If the other aircraft shows no lateral or vertical motion, but is increasing in size, take immediate evasive action.

(6) Visual search at night depends almost entirely on peripheral vision. In order to perceive a very dim lighted object in a certain direction, the pilot should not look directly at the object, but scan the area adjacent to it. Short stops, of a few seconds, in each scan will help to detect the light and its movement.

(7) Lack of brightness and color contrast in daytime and conflicting ground lights at night increase the difficulty of detecting other aircraft.

(8) Pilots are reminded of the requirement to move one's head in order to search around the physical obstructions, such as door and window posts. The doorpost can cover a considerable amount of sky, but a small head movement may uncover an area which might be concealing a threat.

c. Clearing Procedures.

(1) Pilots should:

(i) Prior to taxiing onto a runway or landing area for takeoff, scan the approach areas for possible landing traffic by maneuvering the aircraft to provide a clear view of such areas. It is important that this be accomplished even though a taxi or takeoff clearance has been received.

(ii) During climbs and descents in flight conditions which permit visual detection of other traffic, execute gentle banks left and right at a frequency which permits continuous visual scanning of the airspace about them.

(iii) Execute appropriate clearing procedures before all turns, abnormal maneuvers, or acrobatics.

d. Airspace, Flight Rules, and Operational Environment.

(1) Pilots should be aware of the type of airspace in which they intend to operate in order to comply with the flight rules applicable to that airspace. Aeronautical information concerning the National Airspace System is disseminated by three methods: aeronautical charts (primary); the Aeronautical Information Manual (AIM); and the Notices to Airmen (NOTAM) system. The general operating and flight rules governing the operation of aircraft within the United States are contained in Part 91 of the FAR.

(2) Pilots should:

(i) Use currently effective aeronautical charts for the route or area in which they intend to operate.

(ii) Note and understand the aeronautical legend and chart symbols related to airspace information depicted on aeronautical charts.

(iii) Develop a working knowledge of the various airspace segments, including the vertical and horizontal boundaries.

(iv) Develop a working knowledge of the specific flight rules (FAR 91) governing operation of aircraft within the various airspace segments.

(v) Use the AIM. The Basic Flight Information and ATC Procedures describe the airspace segments and the basic pilot responsibilities for operating in such airspace.

(vi) Contact the nearest FAA Flight Service Station for any pertinent NOTAMS pertaining to their area of operation.

(3) Pilots should also be familiar with, and exercise caution, in those operational environments where they may expect to find a high volume of traffic or special types of aircraft operation. These areas include Terminal Radar Service Areas (TRSA's), airport traffic patterns, particularly at airports without a control tower; airport traffic areas (below 3,000 feet above the surface within five statute miles of an airport with an operating control tower); terminal control areas; control zones, including any extensions; Federal airways; vicinity of VOR's; restricted areas; warning areas; alert areas; Military Operating Areas (MOA); intensive student jet training areas; military low-level high-speed training routes; instrument approach areas; and areas of high density jet arrival/departure routings, especially in the vicinity of major terminals and military bases.

e. Use of Communications Equipment and Air Traffic Advisory Services.

(1) One of the major factors contributing to the likelihood of NMAC incidents in terminal areas that have an operating air traffic control (ATC) system has been the mix of <u>known</u> arriving and departing aircraft with **unknown traffic**. The known aircraft are generally in radio contact with the controlling facility (local, approach, or departure control) and the other aircraft are neither in two-way radio contact nor identified by ATC at the time of the NMAC. This precludes ATC from issuing traffic advisory information to either aircraft.

(2) Although pilots should adhere to the necessary communications requirements when operating VFR, they are also urged to take advantage of the air traffic advisory services available to VFR aircraft.

(3) Pilots should:

(i) Use the AIM.

(A) The basic AIM contains a section dealing with services available to pilots, including information of VFR advisory services, radar traffic information services for VFR pilots, and recommended traffic advisory practices at non-tower airports.

(B) The airport/facility directory contains a list of all major airports showing the services available to pilots and the applicable communication frequencies.

(ii) Develop a working knowledge of those facilities providing traffic advisory services and the area in which they give these services.

(iii) Initiate radio contact with the appropriate terminal radar or nonradar facility when operating within the perimeters of the advertised service areas or within 15 miles of the facility when no service area is specified.

(iv) When it is not practical to initiate radio contact for traffic information, at least monitor the appropriate facility communication frequency, particularly when operating in or through arrival/departure routes and instrument approach areas.

(v) Remember that controller observation of aircraft in the terminal area is often limited by distance, depth perception, aircraft conspicuity, and other normal visual acuity problems. Limitations of radar (when available), traffic volume, controller workload, unknown traffic, etc., may prevent the controller from providing timely traffic advisory information. Traffic advisories are secondary to the controllers' primary duties (which are separating aircraft under their control and issuing safety advisories when aware of safety conflicts). Therefore, the pilot is

responsible for seeing and avoiding other traffic. Traffic advisories should be requested and used when available to assist the pilot to see and avoid other traffic by assisting, but not substituting in any way, the pilot's own visual scanning. It is important to remember that advisories which air traffic control may provide are not intended to lessen in any manner the pilot's obligation to properly scan to see and avoid traffic.

f. Airport Traffic Patterns.

(1) A significant number of midair collisions, as well as near midair collisions, have occurred within the traffic pattern environment.

(2) Pilots should:

(i) When operating at tower-controlled airports, maintain two-way radio contact with the tower while within the airport traffic area. Make every effort to see and properly avoid any aircraft pointed out by the tower, or any other aircraft which may be in the area and unknown to the tower.

(ii) When entering a known traffic pattern at a nontower airport, keep a sharp lookout for other aircraft in the pattern. Enter the pattern in level flight and allow plenty of spacing to avoid overtaking or cutting any aircraft out of the pattern.

(iii) When approaching an unfamiliar airport fly over or circle the airport at least 500 feet above traffic pattern altitude (usually at 2,000 feet or more above the surface) to observe the airport layout, any local traffic in the area, and the wind and traffic direction indicators. Never descend into the traffic pattern from directly above the airport.

(iv) Be particularly alert before turning to the base leg, final approach course, and during the final approach to landing. At nontower airports, avoid entering the traffic pattern on the base leg or from a straight-in approach to the landing runway.

(v) Compensate for blind spots due to aircraft design and flight attitude by moving your head or maneuvering the aircraft.

g. Flying In Formation.

(1) Several midair collisions have occurred which involved aircraft on the same mission, with each pilot aware of the other's presence.

(2) Pilots who are required, by the nature of their operations, to fly in pairs or in formation are cautioned to:

(i) Recognize the high statistical probability of their involvement in midair collisions.

(ii) Make sure that adequate preflight preparations are made and the procedures to be followed are understood by all pilots intending to participate in the mission.

(iii) Always keep the other aircraft in sight despite possible distraction and preoccupation with other mission requirements.

(iv) Avoid attempting formation flight without having obtained instruction and attained the skill necessary for conducting such operations.

h. Flight Instructors, Pilot Examiners, and Persons Acting As Safety Pilots.

(1) The importance of flight instructors training pilot applicants to devote maximum attention to collision avoidance while conducting flight operations in today's increasing air traffic environment cannot be overemphasized.

(2) Flight instructors should set an example by carefully observing all regulations and recognized safety practices, since students consciously and unconsciously imitate the flying habits of their instructors.

(3) Flight instructors and persons acting as safety pilots should:

(i) Guard against preoccupation during flight instruction to the exclusion of maintaining a constant vigilance for other traffic.

(ii) Be particularly alert during the conduct of simulated instrument flight where there is a tendency to "look inside."

(iii) Place special training emphasis on those basic problem areas of concern mentioned in this advisory circular where improvements in pilot education, operating practices, procedures, and techniques are needed to reduce midair conflicts.

(iv) Notify the control tower operator, at airports where a tower is manned, regarding student first solo flights.

(v) Explain the availability of and encourage the use of **expanded radar services** for arriving and departing aircraft at terminal airports where this service is available, as well as, the use of radar traffic advisory services for transiting terminal areas or flying between en-route points.

(vi) Understand and explain the limitations of radar that may frequently limit or prevent the issuance of radar advisories by air traffic controllers (refer to AIM).

(4) Pilot examiners should:

(i) During any flight test, direct attention to the applicant's vigilance of other air traffic and an adequate clearance of the area before performing any flight maneuver.

(ii) Direct attention to the applicant's knowledge of the airspace, available FAA air traffic services and facilities, essential rules, good operating practices, procedures, and techniques that are necessary to achieve high standards of air safety.

i. **Scan Training.** The Aircraft Owners and Pilots Association (AOPA) Air Safety Foundation has developed an excellent educational program designed to inform pilots on effective visual scan techniques. All pilots are encouraged to attend FAA/industry sponsored safety meetings which feature this program. The program, called "Take Two and See," is available on loan through the AOPA Air Safety Foundation, 7315 Wisconsin Avenue, Bethesda, Maryland 20814. For further information on availability of this or any other Accident Prevention Program dealing with collision avoidance, interested persons may contact the Accident Prevention Specialist at any FAA General Aviation District Office of Flight Standards District Office.

Kenneth S. Hunt
Director of Flight Operations

Editor's Recommendation

Flight instructors and pilot applicants should check the FAA Advisory Circular Checklist to determine if this AC is current; the most recent cited should be used. Additionally, any CFR's (Title 14 of the Code of Federal Regulations) formerly incorrectly referred to by the FAA as Federal Aviation Regulation(s) (FAR's), referenced herein should be verified for currency and applicability.

Aviators Publishing - Ed Quinlan

U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

Subject: RECOMMENDED STANDARD TRAFFIC PATTERNS AND PRACTICES FOR AERONAUTICAL OPERATIONS AT AIRPORTS WITHOUT OPERATING CONTROL TOWERS

Date: 8-26-93
Initiated by: ATP-230

AC No.: 90-66A

1. PURPOSE.

This advisory circular (AC) calls attention to regulatory requirements and recommended procedures for aeronautical operations at airports without operating control towers. It recommends traffic patterns and operational procedures for aircraft, lighter than air, glider, parachute, rotorcraft, and ultralight vehicle operations where such use is not in conflict with existing procedures in effect at those airports.

2. CANCELLATION.

AC 90-66, Recommended Standard Traffic Patterns for Airplane Operations at Uncontrolled Airports, dated February 27, 1975, is cancelled.

3. PRINCIPAL CHANGES.

This AC has been updated to reflect current procedures at airports without operating control towers. Principal changes include: adding on "Other Traffic Pattern" section, amending appendix charts to remain consistent with the Aeronautical Information Manual (AIM), expanding the "Related Reading Material" section from "airplane" to "aeronautical" operations, adding definition and references to Common Traffic Advisory Frequency (CTAF), acknowledging straight-in approaches are not prohibited but may be operationally advantageous, and adding a paragraph on wake turbulence.

4. DEFINITIONS.

a. Airports Without Operating Control Towers. Airports without control towers or an airport with a control tower which is not operating. These airports are commonly referred to as non-towered, uncontrolled, or part-time towered airports.

b. Common Traffic Advisory Frequency (CTAF). A frequency designed for the purpose of carrying out airport advisory practices while operating to or from an airport without an operating control tower. The CTAF may be a UNICOM, MULTICOM, flight service station, or tower frequency and is identified in appropriate aeronautical publications.

5. RELATED READING MATERIAL.

a. Airport/Facility Directory (AFD).
b. Aeronautical Information Manual (AIM).
c. Fly Neighborly Guide, Helicopter Association International.
d. Aviation USA, Aircraft Owners and Pilots Association (AOPA).
e. State aviation publications.
f. Various pilot guides.
g. Pilot Operations at Nontowered Airports, AOPA Air Safety Foundation pamphlet.
h. Guidelines for the Operation of Ultralight Vehicles at Existing Airports, United States Ultralight Association.
i. Facts for Pilots, United States Parachute Association.
j. The latest addition of the following AC's also contain information applicable to operations at airports without operating control towers:

(1) AC 90-23, Aircraft Wake Turbulence.

(2) AC 90-42, Traffic Advisory Practices at Airports Without Operating Control Towers.

(3) AC 90-48, Pilot's Role in Collision Avoidance.

(4) AC 91-32, Safety In and Around Helicopters.

(5) AC 103-6, Ultralight Vehicle Operations-Airports, Air Traffic Control, and Weather.

(6) AC 105-2, Sport Parachute Jumping.

6. BACKGROUND AND SCOPE.

a. Regulatory provisions relating to traffic patterns are found in Parts 91, 93, and 97 of the Federal Aviation Regulations (FAR). The airport traffic patterns contained in Part 93 relate primarily to those airports where there is a need for unique traffic pattern procedures not provided for in Part 91. Part 97 addresses instrument approach procedures. At airports without operating control towers, Part 91 requires only that pilots of airplanes approaching to land make all turns to the left unless light signals or visual markings indicate that turns should be made to the right.

b. The Federal Aviation Administration (FAA) believes that observance of a standard traffic pattern and the use of CTAF procedures as detailed in AC 90-42 will improve the safety and efficiency of aeronautical operations at airports without operating control towers.

7. GENERAL OPERATING PRACTICES.

a. Use of standard traffic patterns for all aircraft and CTAF procedures by radio-equipped aircraft are recommended at all airports without operating control towers. However, it is recognized that other traffic patterns may already be in common use at some airports or that special circumstances or conditions exist that may prevent use of the standard traffic pattern.

b. The use of any traffic pattern procedure does not alter the responsibility of each pilot to see and avoid other aircraft. Pilots are encouraged to participate in "Operation Lights On," which is a voluntary pilot safety program described in the AIM designed to enhance the "see-and-avoid" requirement.

c. As part of the preflight familiarization with all available information concerning a flight, each pilot should review all appropriate publications (AFD, AIM, Notices to Airmen (NOTAM), etc.), for pertinent information on current traffic patterns at the departure and arrival airports.

d. It is recommended that pilots utilize visual indicators, such as the segmented circle, wind direction indicator, landing direction indicator, and traffic pattern indicators which provide traffic pattern information.

e. The FAA encourages pilots to use the standard traffic pattern. However, for those pilots who choose to execute a straight-in approach, maneuvering for and execution of the approach should be completed so as not to disrupt the flow of arriving and departing traffic. Therefore, pilots operating in the traffic pattern should be alert at all times to aircraft executing straight-in approaches.

f. Pilots who wish to conduct instrument approaches should be particularly alert for other aircraft in the pattern so as to avoid interrupting the flow of traffic. Position reports on the CTAF should include distance and direction from the airport, as well as the pilot's intentions upon completion of the approach.

g. Pilots of inbound nonradio-equipped aircraft should determine the runway in use prior to entering the traffic pattern by observing the landing direction indicator or by other means. Pilots should be aware that procedures at airports without operating control towers generally do not require the use of two-way radios; therefore, pilots should be especially vigilant for other aircraft while operating in the traffic pattern.

h. Wake turbulence is generated by all aircraft. Therefore, pilots should expect to encounter turbulence while operating in a traffic pattern and in proximity to other aircraft. Aircraft components and equipment can be damaged by wake turbulence. In flight, avoid the area below and behind the aircraft generating turbulence especially at low altitude where even a momentary wake encounter can be hazardous. All operators should be aware of the potential adverse effects that their wake, rotor or propeller turbulence has on light aircraft and ultralight vehicles.

8. RECOMMENDED STANDARD TRAFFIC PATTERN.

Airport owners and operators, in coordination with the FAA, are responsible for establishing traffic patterns. However, the FAA encourages airport owners and operators to establish traffic patterns as recommended in this AC. Further, left traffic patterns should be established except where obstacles, terrain, and noise-sensitive areas dictate otherwise. Pages 8.50–8.52 contains diagrams for recommended standard traffic patterns.

a. Prior to entering the traffic pattern at an airport without an operating control tower, aircraft should avoid the flow of traffic until established on the entry leg. For example, wind and landing direction indicators can be checked while at an altitude above the traffic pattern. When the proper traffic pattern direction has been determined, the pilot should then proceed to a point well clear of the pattern before descending to the pattern altitude.

b. Arriving aircraft should be at the appropriate traffic pattern altitude before entering the traffic pattern. Entry to the downwind leg should be at a 45-degree angle abeam the midpoint of the runway.

c. It is recommended that airplanes observe a 1000-foot above ground level (AGL) traffic pattern altitude. Large and turbine-powered airplanes should enter the traffic pattern at an altitude of 1,500 feet AGL or 500 feet above the established pattern altitude. A pilot may vary the size of the traffic pattern depending on the aircraft's performance characteristics.

d. The traffic pattern altitude should be maintained until the aircraft is at least abeam the approach end of the landing runway on the downwind leg.

e. The base leg turn should commence when the aircraft is at a point approximately 45 degrees relative bearing from the runway threshold.

f. Landing and takeoff should be accomplished on the operating runway most nearly aligned into the wind. However, if a secondary runway is used, pilots using the secondary runway should avoid the flow of traffic to the runway most nearly aligned into the wind.

g. Airplanes on takeoff should continue straight ahead until beyond the departure end of the runway. Aircraft executing a go-around maneuver should continue straight ahead, beyond the departure end of the runway, with the pilot maintaining awareness of other traffic so as not to conflict with those established in the pattern. In cases where a go-around was caused by an aircraft on the runway, maneuvering parallel to the runway may be required to maintain visual contact with the conflicting aircraft.

h. Airplanes remaining in the traffic pattern should not commence a turn to the crosswind leg until beyond the departure end of the runway and within 300 feet below traffic pattern altitude, with the pilot ensuring that the turn to downwind leg will be made at the traffic pattern altitude.

i. When departing the traffic pattern, airplanes should continue straight out or exit with a 45-degree left turn (right turn for right traffic pattern) beyond the departure end of the runway after reaching pattern altitude. Pilots need to be aware of any traffic entering the traffic pattern prior to commencing a turn.

j. Airplanes should not be operated in the traffic pattern at an indicated airspeed of more than 200 knots (230 mph).

k. Throughout the traffic pattern, right-of-way rules apply as stated in FAR Part 91.113. Any aircraft in distress has the right-of-way over all other aircraft. In addition, when converging aircraft are of different categories, a balloon has the right-of-way over any other category of aircraft; a glider has the right-of-way over an airship, airplane, or rotorcraft; and an airship has the right-of-way over an airplane or rotorcraft.

9. OTHER TRAFFIC PATTERNS.

Airport operators routinely establish local procedures for the operation of gliders, parachutists, lighter than air aircraft, helicopters, and ultralight vehicles. See illustrations on pages 8.50–8.52 for these operations as they relate to recommended standard traffic patterns.

a. Rotorcraft.

(1) In the case of a helicopter approaching to land, the pilot must avoid the flow of fixed-wing aircraft and land on a marked helipad or suitable clear area. Pilots should be aware that at some airports, the only suitable landing area is the runway.

(2) All pilots should be aware that rotorcraft may fly slower and approach at steeper angles than airplanes. Air taxi is the preferred method for helicopter ground movements which enables the pilot to proceed at an optimum airspeed, minimize downwash effect, and conserve fuel. However, flight over aircraft, vehicles, and personnel should be avoided.

(3) In the case of a gyrocopter approaching to land, the pilot should avoid the flow of fixed-wing aircraft until turning final for the active runway.

(4) A helicopter operating in the traffic pattern may fly a pattern similar to the airplane pattern at a lower altitude (500 AGL) and closer to the airport. This pattern may be on the opposite side of the runway with turns in the opposite direction if local policy permits.

(5) Both classes of rotorcraft can be expected to practice power-off landing (autorotation) which will involve a very steep angle of approach and high rate of descent (1,500-2,000 feet/minute).

b. Gliders.

(1) A glider, including the tow aircraft during towing operations, has the right-of-way over powered aircraft.

(2) If the same runway is used by both airplanes and gliders, the glider traffic pattern will be inside the pattern of engine driven aircraft. If a "Glider Operating Area" is established to one side of a powered-aircraft runway, the glider pattern will normally be on the side of the airport closest to the "Glider Operating Area." This will allow gliders to fly the same direction traffic pattern as powered aircraft in one wind condition and necessitate a separate opposing direction traffic pattern in the opposite wind condition. (See examples in Appendix 2, Glider Operations).

(3) Typically, glider traffic patterns have entry points (initial points) from 600 to 1,000 feet AGL.

c. Ultralight Vehicles.

(1) In accordance with FAR Part 103, ultralight vehicles are required to yield the right-of-way to all aircraft.

(2) Ultralight vehicles should fly the rectangular pattern as described in Appendix 2. Pattern altitude should be 500 feet below and inside the standard pattern altitude established for the airport. An ultralight pattern with its own dedicated landing area will typically have a lower traffic pattern parallel to the standard pattern with turns in the opposite direction.

(3) All pilots should be aware that ultralights will fly significantly slower than airplanes.

In addition, ultralights may also exhibit very steep takeoff and approach angles. Turns may be executed near the end of the runway in order to clear the area expediently.

d. Lighter Than Air Aircraft.

(1) A balloon has the right-of-way over any other category of aircraft and does not follow a standard traffic pattern.

(2) Due to limited maneuverability, airships do not normally fly a standard traffic pattern. However, if a standard traffic pattern is flown, it will be at an airspeed below most other aircraft.

e. Parachute Operations.

(1) All activities are normally conducted under a NOTAM noting the location, altitudes, and time or duration of jump operations. The Airport/Facility Directory lists airports where permanent drop zones are located.

(2) Jumpers normally exit the aircraft either above, or well upwind of, the airport and at altitudes well above traffic pattern altitude. Parachutes are normally deployed between 2,000 feet and 5,000 feet AGL and can be expected to be below 3,000 feet AGL within 2 miles of the airport.

(3) Pilots of jump aircraft are required by Part 105 to establish two-way radio communications with the air traffic control facility or Flight Service Station which has jurisdiction over the affected airspace prior to jump operations for the purpose of receiving information in the aircraft about known air traffic in the vicinity. In addition, when jump aircraft are operating at or in the vicinity of an airport, pilots are also encouraged to provide advisory information on the CTAF, i.e., "Chambersburg traffic, jumpers away over Chambersburg.

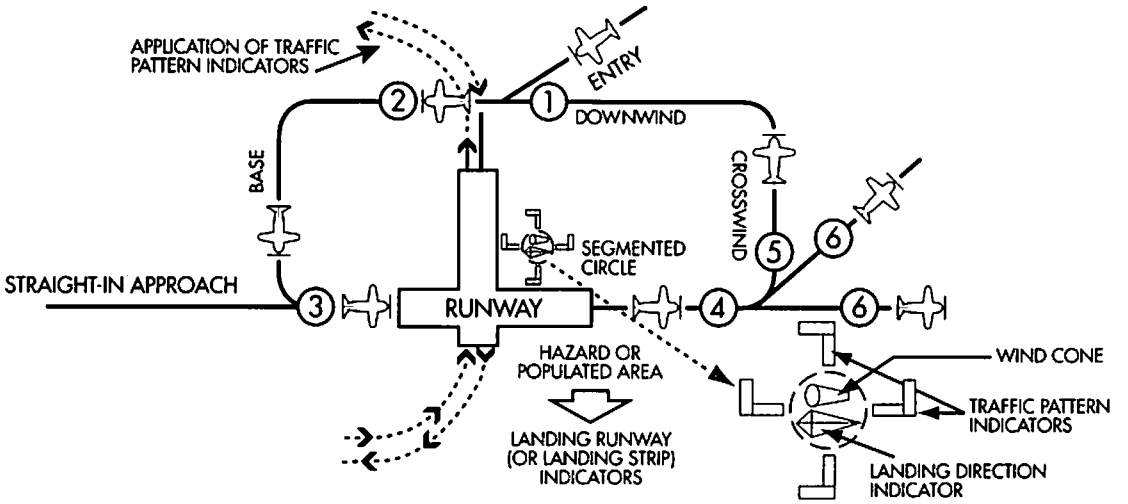
(4) When a drop zone has been established on an airport, parachutists are expected to land within the drop zone. At airports that have not established drop zones, parachutists should avoid landing on runways, taxiways, aprons, and their associated safety areas. Pilots and parachutists should both be aware of the limited flight performance of parachutes and take steps to avoid any potential conflicts between aircraft and parachute operations.

(5) See diagram operations conducted by parachutists on page 8.52.

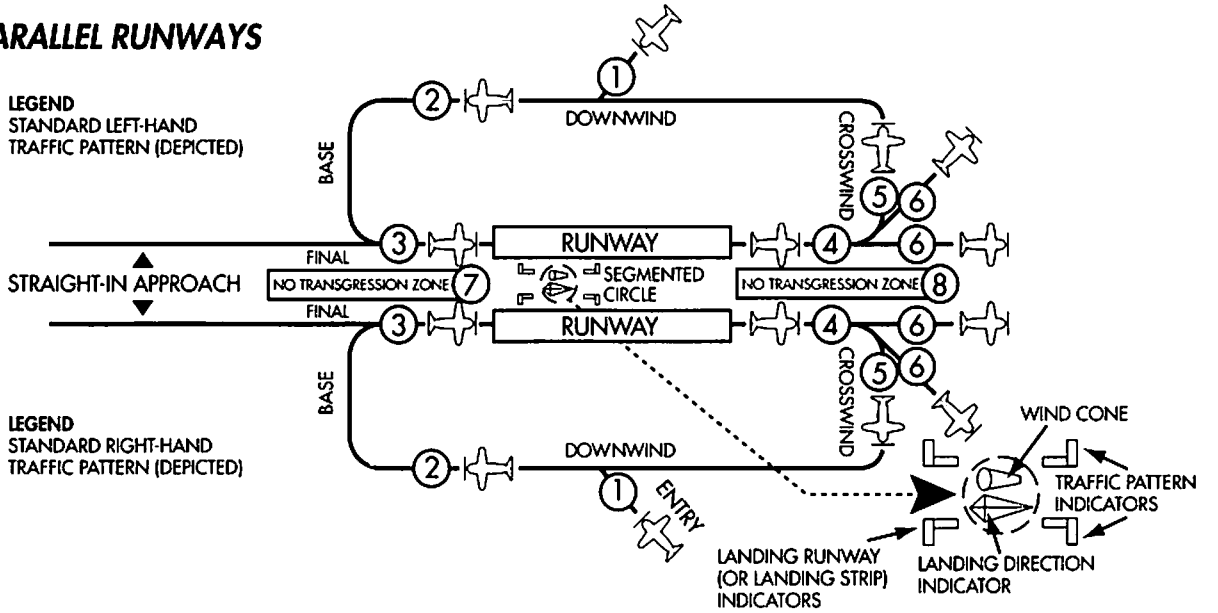
Harold W. Becker
Acting Director, Air Traffic
Rules and Procedures Service

AIRPORT OPERATIONS

SINGLE RUNWAY



PARALLEL RUNWAYS



KEY

① Enter pattern in level flight, abeam the midpoint of the runway, at pattern altitude. (1000' AGL is recommended pattern altitude unless established otherwise).

② Maintain pattern altitude until abeam approach end of the landing runway, or downwind leg.

③ Complete turn to final at least 1/4 mile from the runway.

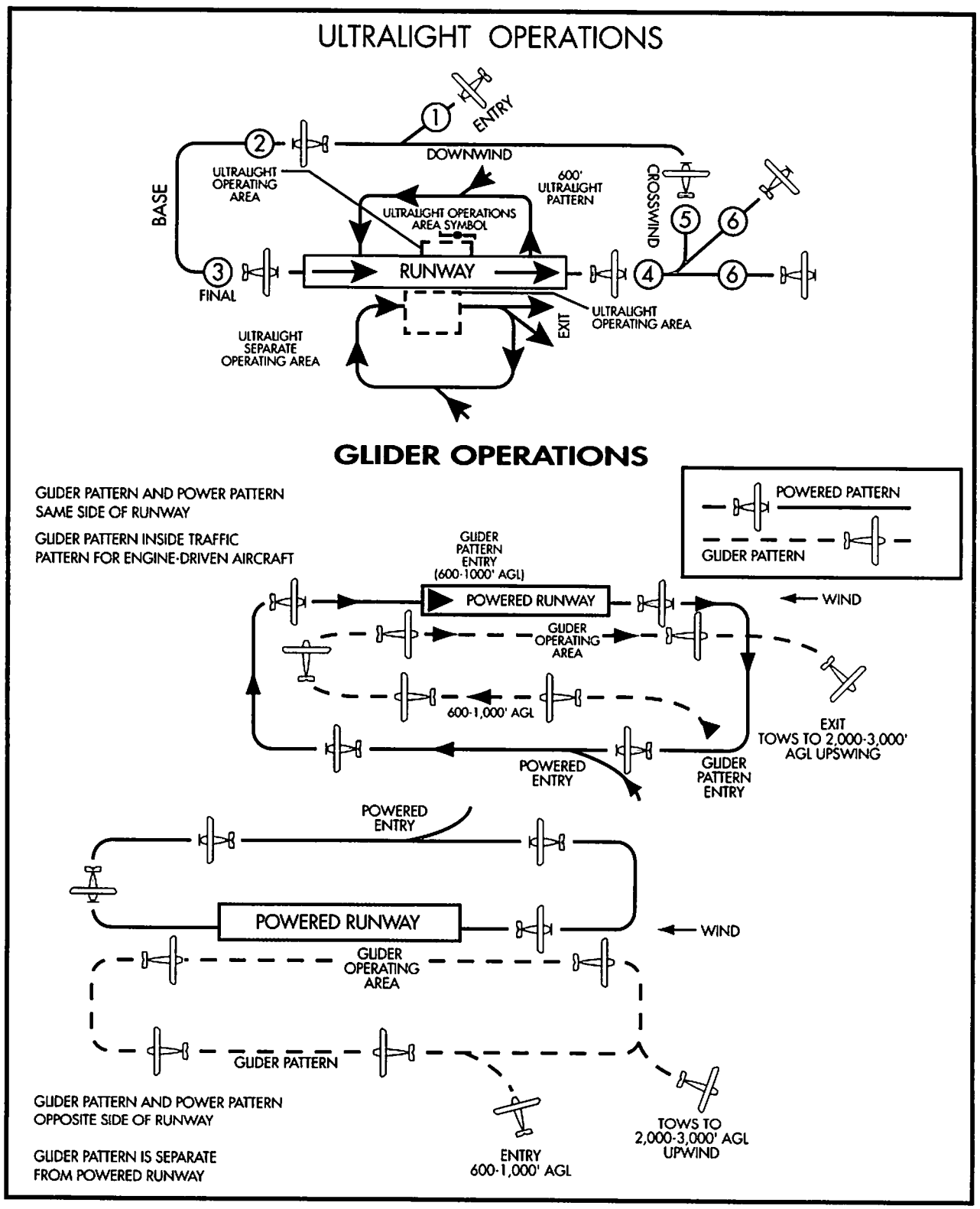
④ Continue straight ahead until beyond departure end of runway.

⑤ If remaining in the traffic pattern, commence turn to crosswind leg beyond the departure end of the runway, within 300 feet of pattern altitude.

⑥ If departing the traffic pattern, continue straight out, or exit with a 45° left turn beyond the departure end of the runway, after reaching pattern altitude.

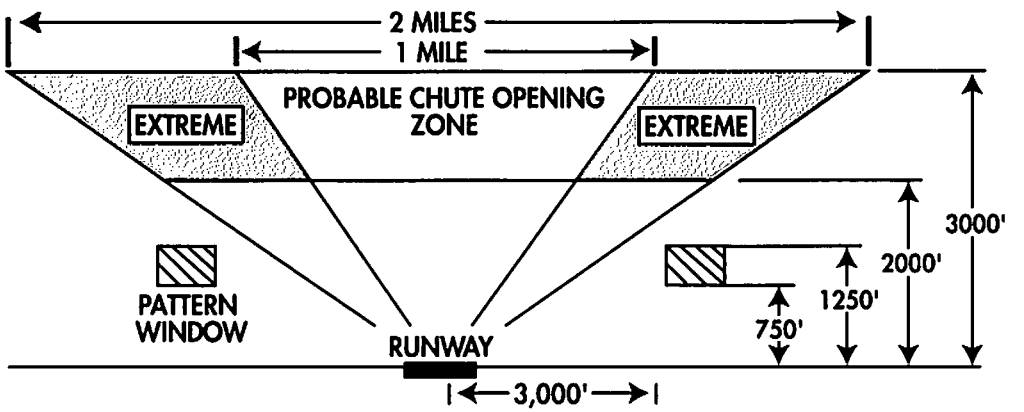
⑦ Do not overshoot final or continue on a track which will penetrate the final approach of the parallel runway.

⑧ Do not continue on a track which will penetrate the departure path of the parallel runway.

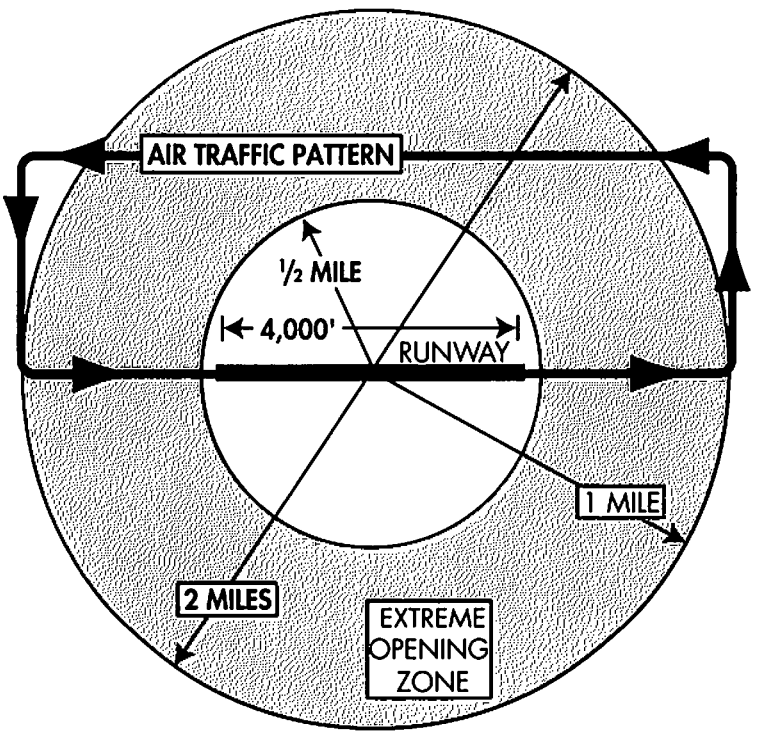

ULTRALIGHT OPERATIONS
ENTRY
DOWNWIND
BASE
ULTRALIGHT OPERATING AREA
600' ULTRALIGHT PATTERN
CROSSWIND
ULTRALIGHT OPERATIONS AREA SYMBOL
RUNWAY
FINAL
ULTRALIGHT SEPARATE OPERATING AREA
EXIT
ULTRALIGHT OPERATING AREA
GLIDER OPERATIONS
GLIDER PATTERN AND POWER PATTERN SAME SIDE OF RUNWAY
GLIDER PATTERN INSIDE TRAFFIC PATTERN FOR ENGINE-DRIVEN AIRCRAFT
POWERED PATTERN
GLIDER PATTERN
GLIDER PATTERN ENTRY (600-1000' AGL)
POWERED RUNWAY
WIND
GLIDER OPERATING AREA
600-1,000' AGL
EXIT TOWS TO 2,000-3,000' AGL UPSWING
POWERED ENTRY
GLIDER PATTERN ENTRY
POWERED ENTRY
POWERED RUNWAY
WIND
GLIDER OPERATING AREA
GLIDER PATTERN
GLIDER PATTERN AND POWER PATTERN OPPOSITE SIDE OF RUNWAY
GLIDER PATTERN IS SEPARATE FROM POWERED RUNWAY
ENTRY 600-1,000' AGL
TOWS TO 2,000-3,000' AGL UPWIND

PARACHUTE OPERATIONS

SIDE VIEW



TOP VIEW



"NOTE: THIS DEPICTS AN AIRPORT WHERE NO DROP ZONE HAS BEEN ESTABLISHED."

The Practical Test - Philosophy

The **Practical Test Standards (PTS)** publication has been created jointly by the FAA and industry and represents the FAA's standardized test for certification. The Practical Test Standard is the essential part of the FAA's intent to assure the public of a fair and objective evaluation process. All examiners and FAA inspectors are **required** to test applicants in accordance with the procedures and standards shown in the PTS.

The practical test is the final step in the FAA certification process. It serves the dual purpose of determining that the applicant has completed the required training to a level of proficiency required by the Administrator and that the applicant can safely perform the tasks required for the certificate or rating being sought.

The philosophy of the practical test is to observe the applicant as he or she completes the routine, non-routine, and emergency tasks that are required of the applicant in order to operate safely under the particular certificate or rating being sought. Tasks are evaluated through both oral questioning and the observation of ground and in-flight procedures. Oral questioning may be used at anytime throughout the test. Questions will always be of a **practical nature** and should generally be referenced to the respective sources shown in the PTS for the particular task. **Evaluating pilot technique, procedures, or answers to oral questions, based on reference sources other than those shown in the PTS, may be inappropriate and inconsistent with a sense of fairness to the applicant and the recommending instructor.** Such procedures or questions should be avoided. Likewise, requiring an applicant to state seldom used aircraft limitations and procedures from memory, without the use of normally available placards, markings, and aircraft limitation material, is also inconsistent with the philosophy of a practical test. A sense of fairness to the public during the conduct of the practical test is of the very highest priority to the FAA.

The examiner's role is to fairly and objectively represent the Administrator during an applicant's final evaluation process. This role requires the proper use by examiners of the Practical Test Standards. **The FAA believes that the PTS is the essential means toward the accomplishment of the desired objectives of fairness and objectivity.** The FAA is dependent on the experience and integrity of the examiner in this area and expects a fair and objective evaluation to the practical standard. As a representative of the FAA, the examiner is the single most important link in the certification process of new pilots.

Emphasis added by editor, Ed Quinlan

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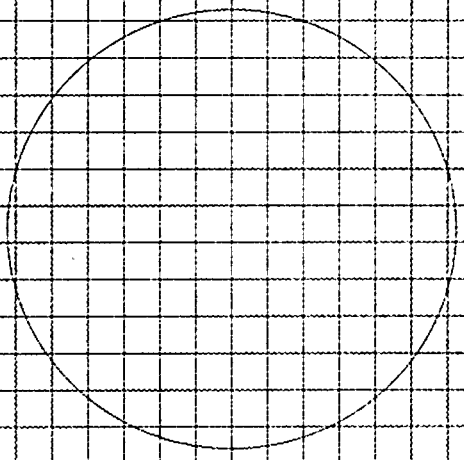
Flight Notes



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The latest revision of the references cited should be used.

Flight instructors should inform all pilots to maintain a current copy of the Advisory Circular Checklist, AC 00-2, which is free, and published annually. However, pilots must specifically request to be placed on the AC 00-2 mailing list. Send your request with full name and complete mailing address to:

U.S. Department of Transportation
General Services Section,
M-443.2
Washington, D. C. 20590
or
FAX 202-366-2795

The Advisory Circular Checklist, AC 00-2, was primarily designed to list new, current, and canceled ACs. The checklist also lists other publications, such as the Practical Test Standards (PTS), written knowledge tests, major flying publications, and discusses other significant items, such as logging onto one of the FAA's many computer bulletin boards.

AC 00-2 lists publications both by number and alphabetically by title, and each is accompanied by a short description. AC 00-2 list is the master directory or index needed to effectively tap the wealth of FAA published aviation information.

Editor's Note

Flight instructors and pilot applicants should check the FAA Advisory Circular Checklist to determine if an AC is current; the most recent cited should be used.

Aviators Publishing - Ed Quinlan

Glossary Of Abbreviations, Acronyms, Definitions, and Contractions

/	And
+	In Addition/Also
-	Minus, subtract, or deduct
±	Plus or minus

A

A&E	Airframe and Engine (Mechanic)
A&P	Airframe and Powerplant (Mechanic)
A/C	Aircraft
A/C	Approach Control
AAS	Airport Advisory Service
ABD	Aboard
ABM	Abeam
AC	Advisory Circular
AC	Approach Control Tower
ACDO	Air Carrier District Office
ACFT	Aircraft
ACO	Aircraft Certification Office
AD	Airworthiness Directive
ADCUS	Advise Customs
ADF	Automatic Direction Finder
ADIZ	Air Defense Identification Zone
ADM	Aeronautical Decision Making
AFB	Air Force Base
AFD	Airport/Facility Directory
AFGS	Auto Flight Guidance System
AFM	Airplane Flight Manual
AFM/SOP	Approved Airplane Flight Manual and Standard Operation Procedure(s)
AFSS	Automated Flight Service Station
AGAS	Aviation Gasoline
AGE	Aerospace Ground Equipment
AGL	Above Ground Level
AI	Attitude Indicator
AID	Airport Information Desk
AIM	Aeronautical Information Manual
AIR	Aerospace Information Report
AIRMET	Airmen's Meteorological Information
AIRMET	Weather Advisory-Warning Light Aircraft (WA)
ALS	Approach Light System
ALT	Altimeter (Millibars Or Inches Of Hg)
Alt	Altitude (5 Types) Absolute, Indicated, Pressure, True, and Density
ALTRV	Altitude Reservation
AMOS	Automatic Meteorological Observing System
AOA	Angle Of Attack
AOA	At or Above
AOB	At or Below
AOE	Airport Of Entry
AOPA	Aircraft Owners and Pilots Association
AP	Airport
APC	Area Positive Control
APCH	Approach
APL	Airport Layout Plan
APL	Airport Lights
APU	Auxiliary Power Units
ARC	Constant Radius Around DME Facility
ARFF	Aircraft Rescue & Fire Fighting
ARP	Aerospace Recommended Practice
ARP	Airport Reference Point
ARPT	Airport
ARSA	Airport Radar Service Area
ARSR	Air Route Surveillance Radar
ARTCC	Air Route Traffic Control Center
AS	Airspeed
ASAP	As Soon As Possible
ASDA	Accelerate Stop Distance Available
ASDE	Airport Surface Detection Equipment
ASEL	Airplane, Single Engine Land
ASI	Airspeed Indicator
ASI	Altimeter Setting Indicator
ASL	Above Sea Level
ASOS	Automated Surface Observation System
ASR	Airport Surveillance Radar
ASRS	Aviation Safety Reporting Service
AT	Air Traffic
ATA	Actual Time of Arrival
ATC	Air Traffic Control
ATCC	Air Traffic Control Center
ATCRBS	Air Traffic Control Radar Beacon System
ATCT	Airport Traffic Control Tower
ATD	Actual Time Of Departure
ATIS	Automatic Terminal Information Service
ATP	Air Traffic Procedures
ATP	Airline Transport Pilot
ATR	Air Transport Rating (Obsolete)
ATS	Auto Throttle System
AUTOB	Automatic Weather Reporting System
Avgas	Aviation Gasoline
AWOS	Automated Weather Observing System
AWW	Severe Weather Forecast Alerts
AWY	Airway
AZM	Azimuth

B

BA	Braking Action
BAG	Best Angle Of Glide Speed
BAL	Balance
BASE	Cloud Base
BC	Back Course
BCM	Back Course Marker
BCN	Beacon
BEDK	Before Dark
BFR	Biennial Flight Review
BL	Base Leg
BLN	Balloon
BLO	Below
BRAF	Braking Action Fair
BRAG	Braking Action Good
BRAN	Braking Action Nil
BRAP	Braking Action Poor
BTU	British Thermal Unit
BYD	Beyond

C

C	Center (Runway ID)
° C	Degrees Celsius
CAA	Civil Aeronautics Administration (Now FAA)
CAAS	Class A Airspace
CAB	Civil Aeronautics Board
CAF	Cleared As Filed
CAMI	Civil Aeromedical Institute
CAP	Civil Air Patrol
CAR	Civil Aviation Regulations
CAS	Calibrated Airspeed
CAS	Collision Avoidance System
CAT	Category
CAT	Clear Air Turbulence
CAT II	ILS Category II (Instrument Procedure)
CAVU	Clear Above Visibility Unlimited
CBAS	Class B Airspace
CBSA	Class B Surface Area
CBT	Computer Based Training
CCAS	Class C Airspace
CCLKWS	Counterclockwise
CCRZ	Climb and Cruise
CCSA	Class C Surface Area
CD	Clearance Delivery
CDAS	Class D Airspace
CDI	Course Deviation Indicator (Needle or Digital)
CDSA	Class D Surface Area
CEAS	Class E Airspace
CERT	Certificate
CESA	Class E Surface Area
CFA	Controlled Firing Area
CFAP	Cleared For Approach
CFI	Certificated Flight Instructor
CFI IA	Certificated Flight Instructor Instrument Airplane
CFIT	Controlled Flight Into Terrain
CFR	Title 14 of the Code of Federal Regulations
CG	Center Of Gravity (Weight)
CH	Compass Heading
CH	(TC(+R-L WAC)=TH(-E+W VAR)=MH(± DEV)=CH
CHG	Change
CHOK	Check Okay
CHT	Cylinder Head Temperature
CIFP	Cancel IFR Flight Plan
CIG	Ceiling
CIRNAV	Circumnavigate
CK	Check
CL	Centerline
CL	Course Line
CLKWS	Clockwise
CLSD	Closed
CNCL	Cancel
CNCLD	Canceled
CNL	Cancel
CNLFP	Cancel Flight Plan
COC	Cause Of Crash
COC	Climb On Course
COMM	Commercial
COP	Changeover Point
CP	Center Of Pressure (Lift)
CPF	Complete Power Failure
Cpt	Clearance (Pre-Taxi Procedure)
CQN	Correction
CRES	Corrosion Resistant
CRM	Cockpit Resource Management
CRM	Crew Resource Management
CRS	Course
CRW	Crew Resource Management
CT	Control Tower
CTAF	Common Traffic Advisory Frequency
CTL	Calculated Landing Time
CTLZ	Control Zone
CVFP	Cancel VFR Flight Plan
CVFP	Charted Visual Flight Procedures
CVINO	Clearance Void If Not Off (Time)
CVT	Clearance Void Time
CWA	Center Weather Advisory (ATC)
CWS	Control Wheel Steering

D

DA	Decision Altitude
DEG	Degree
DEP	Departure/Depart
DER	Designated Engineering Representative
DEV	Deviation
DF	Direction Finder Guidance/DF Steer - See (ADF)
DFL	Daily Flight Log
DG	Directional Gyro
DH	Decision Height
DIST	Distance
DME	Distance Measuring Equipment
DMSTN	Demonstration
DOD	Department Of Defense
DOT	Department Of Transportation
DP	Dew-Point Temperature
DPCR	Departure Procedure
DPE	Designated Pilot Examiner
DR	Dead Reckoning/Direct Route
DR	Direct Route
DRCT	Direct
DUATS	Direct User Access Terminal System
DVFR	Defense Visual Flight Rules
DWPNT	Dew Point

E

E-SOP	Emergency Standard Operating Procedure(s)
EW	Empty Weight
EAA	Experimental Aircraft Association
EAC	Expected Approach Clearance
EAS	Equivalent Airspeed
EAT	Expected Approach Time
ECO	Engine Certification Office
EDCT	Expect Departure Clearance (Time)
EDR	Expected Departure Release
EEC	Engine Electronic Control
EFAS	En Route Flight Advisory Service
EFC	Expect Further Clearance (Time)
EFIS	Electronic Flight Instrument Systems
EGT	Exhaust Gas Temperature
EHF	Extremely High Frequency
EICAS	Engine Instrument Crew Advisory Systems
ELEV	Elevation
ELF	Extremely Low Frequency
ELT	Emergency Locator Transmitter (Radio)
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
ENG	Engine
EPT	Effective Performance Time
ETA	Estimated Time Of Arrival
etc	Et cetera
ETD	Estimated Time of Departure
ETE	Estimated Time En Route

Glossary Of Abbreviations, Acronyms, Definitions, and Contractions

EW	Empty Weight

F

° F	Degrees Fahrenheit Temperature
FA	Area Forecast
FA	Final Approach
FAA	Federal Aviation Administration
FAAP	FAA Safety Pamphlet
FAF	Final Approach Fix
FAP	Final Approach Point
FAR	Federal Aviation Regulation(s) see CFR
FBO	Fixed Base Operator
FCC	Federal Communications Commission
FD	Flight Director
FD	Wind and Temperatures Aloft Forecasts
FDC	Flight Data Center (NOTAMs)
FE	Flight Engineer
FFS	Flight Following Service
FIR	Flight Information Region
FL	Flight Level
FM	75 mc. Fan Marker
FM	Fan Marker
FM	Frequency Modulation
FMS	Flight Management System
FOB	Fuel On Board
FP	Flight Plan
FPM	Feet Per Minute
FR	Fuel Remaining
FRC	Request Full Route Clearance
FREQ	Frequency
FRH	Fly Runway Heading
FSDO	Flight Standards District Office (FAA)
FSL	Full Stop Landing
FSS	Flight Service Stations (FAA)
ft/(')	Feet/Foot (Measurement)
FT	Terminal Forecasts
FTD	Flight Training Device
FYI	For Your Information

G

g	Acceleration Of Gravity, Gravity, G-force
G	Gravity (Weight)
GW	Gross Weight
GA	General Aviation
GA	Glide Angle
GADO	General Aviation District Office
GC	Ground Control
GCA	Ground Control Approach
GECRF	World Geographic Reference System
GMT	Greenwich Mean Time (Zulu Time) (UTC)
GND	Ground
GOX	Gaseous Oxygen
GP	Glide Path
GPH	Gallons Per Hour
GPS	Global Positioning System
GS	Glide Slope
GS	Groundspeed
GSE	Ground-Support Equipment
GWT	Gross Weight

H

HAA	Height Above Airport
HAL	Height Above Landing
Handees	Hand Movement For Illustrative Purposes
HAT	Height Above Touchdown
HAZ	Hazard
HB	Homing Beacon
HDTA	High Density Traffic Airport
HF	High Frequency
Hg	Chemical Symbol For Mercury
HI	Heading Indicator
HIRL	High-Intensity Runway Light System
HIWAS	Hazardous In-Flight Weather Advisory Service
HLDG	Holding
Hobbs	Engine/Flight Hourly Recorder
HP	Holding Pattern
HR/hr.	Hour (Time)
HSI	Horizontal Situation Indicator
Hz	Hertz

I

IAF	Initial Approach Fix
IAO	In and Out Of Clouds
IAP	Initial Approach
IAP	Instrument Approach Procedure(s)
IAS	Indicated Airspeed
ICAO	International Civil Aviation Organization
ID	Identification
IEOG	IFR Exam-O-Grams
IFR	Ceiling < 1000' and/or Visibility < 3 Miles
IFR	Instrument Flight Rules
IFR Hood	View-Limiting Device For Simulated IFR
IFSS	International Flight Service
ILS	Instrument Landing System
IM	Inner Marker (ILS)
IMC	Instrument Meteorological Conditions (IFR)
in./(")	Inch(s) (Measurement)
INA	Initial Approach
INOP	Inoperative
INST	Instrument
INT	Intersection
INTCP	Intercept
IP	Instructor Pilot
IR	Ice on Runway/s
IR	Instrument reference, flight by
IRAN	Inspect and Repair As Necessary
ISA	International Standard Atmospheric Conditions

J

jATO	Jet Assisted Takeoff
JP	Jet Propellant

K

KCAS	Knots Calibrated Airspeed
KHZ	Kilo Hertz
KIAS	Knots Indicated Airspeed
Knot	Nautical Mile = 6,076.1 Feet Factor 1.15
KT	Knots
KTAS	Knots True Airspeed
Kts.	Knots

L

L	Compass Locator, See also LOM or LMM
L/D	Lift-Drag Ratio (lift coefficient/drag coefficient)
LAA	Local Airport Advisory
LAT	Latitude
lbs.	Pound (Force Or Mass)
LCL	Local
LDA	Landing Distance Available
LDA	Localizer-Type Directional Aid
LDG	Landing
LDIN	Lead In Lighting System
LEMAC	Leading Edge Mean Aerodynamic Chord
LF	Low Frequency
LFM	VHF Fan Marker (5 watts)
LFR	Low-Frequency Radio Range
LGT	Light
LIFR	Ceiling < 500' and/or Visibility < 1 Mile
LIRL	Low Intensity Runway Lights
LLWAS	Low Level Wind Shear Alert System
LMM	Low Frequency Compass Locator At ILS Middle Marker
LNDG	Landing
LOA	Letter Of Agreement
LOC	ILS Localizer
LOC/BC	Localizer Back Course
LOFT	Line Oriented Flight Training
LOM	Compass Locator At ILS Outer Marker
LOM	Low Frequency Compass Locator At ILS Outer Marker
LONG	Longitude
LOP	Line Of Position (Navigation)
LORAC	Long-Range Accuracy
LORAN	Long-Range Radio Navigation System
LOX	Liquid Oxygen
LP	Left Traffic Pattern
LP	Liquid Propellant
LRCO	Limited Remote Communication Outlet
LRN	Loran
LT	Left Turn
LTF	Local Training Flight
LVL	Level
LVLOF	Level Off
LVOR	Low Power VOR

M

M	Mach Number
M	Magnetic (After a Bearing)
m	Meter(s)
MAA	Maximum Authorized IFR Altitude
MAC	Mean Aerodynamic Chord
MAC	Midair Collision
MACH	Mach Number (speed ratio to speed of sound)
MACH	Ratio Of The Speed Of Motion To The Speed Of Sound
MAG	Magnetic
MALS	Medium-Intensity Approach Lighting System
MALSR	Medium Intensity Approach Light System With Runway Alignment Indicator Lights
MAN	Manual
MAP	Aeronautical Maps and Charts
MAP	Missed Approach Point
MAX	Maximum
MB	Marker Beacon
MB	Millibars
MBO	Military Base Operation
MC	Magnetic Compass Or Magnetic Course
MC	Megacycle; 1 million cycles per second
MCA	Minimum Crossing Altitude
MDA	Minimum Descent Altitude
MEA	Minimum En Route IFR Altitude
MED	Medical
MEF	Minimum Elevation Figure
MEL	Minimum Equipment List
MEL	Multiengine Land
MES	Multiengine Sea
MET	Meteorological
METAR	Aviation Routine Weather Report
MF	Medium Frequency
MFG	Manufacturer
MFL	Maintain Flight Level
MFOB	Minimum Fuel On Board
MH	Magnetic Heading
MHA	Minimum Holding Altitude
MHZ	Mega Hertz
MIA	Minimum IFR Altitudes
MIL	Military
MIN	Minimum
MIN	Minute
MIRL	Medium Intensity Runway Edge Lights
MLS	Microwave Landing System
MM	Middle Marker (ILS)
Mmo	Mach Number
MN	Magnetic North
MNVR	Maneuver
MOA	Military Operations Area
MOCA	Minimum Obstruction Clearance Altitude
MODE C	Transponder Altitude Reporting (ATC)
MP	Manifold Pressure (Engine)
MPH	Miles Per Hour (Verify Knots Or Statute)
MRA	Minimum Reception Altitude
MSA	Minimum Safe Altitude
MSAW	Minimum Safe Altitude Warning
MSL	Mean Sea Level
MTR	Military Training Routes
MVA	Minimum Vectoring Altitude
MVFR	Ceiling 1000'/ 3000' and/or Visibility 3 To 5 Miles
MVSP	Maintain Visual Separation

N

N A/G	No Air To Ground Communications
N/A	Not Applicable
NA	Not Authorized
NACA	National Advisory Committee For Aeronautics
NAFI	National Association Of Flight Instructors
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NAV	Navigation
NAV/	

Glossary Of Abbreviations, Acronyms, Definitions, and Contractions

COM	Navigation and Communication Radios
NAVAID	Air Navigational Aid
NAVAID	Navigational Aid
NDB	Nondirectional Radio Beacon (ADF)
NDE	No Delay Expected
NEC	No Change In Estimates
NEG	Negative
NEXRAD	Next Generation Weather Radar
NFCT	Non-Federal Control Tower
NFDC	National Flight Data Center
NIFA	National Intercollegiate Flying Association
NM	Nautical Mile Converting Factor 1.15
NMAC	Near Midair Collision
NO	Number
NOAA	National Oceanic and Atmospheric Administration
NOPT	No Procedure Turn Required/Authorized
NOS	National Ocean Service
NOSUM	NOTAM Summary
NOTAM D	Notice To Airmen Domestic
NOTAMS	Notices To Airmen
NPRM	Notice Of Proposed Rulemaking
NSP	Nonstandard Holding Pattern
NTE	Not To Exceed
NTFY	Notify
NTR	No Traffic Reported
NTSB	National Transportation Safety Board
NWS	National Weather Service

O

O_2	Oxygen
OA	Overhead Approach
OAT	Outside Air Temperature
OB	On Board
OBI	Omni Bearing Indicator
OBS	Omnibearing Selector (VOR)
OC	On Course
OCA	Oceanic Control Area
OCH	Obstacle Clearance Height
OCL	Obstruction
OEI	One Engine Inoperative
OFM	Out For Maintenance
OI	On Instruments
OM	75 mc. Outer Marker On ILS
OM	Outer Marker (ILS)
OPER	Operate
OPG	Oil Pressure Gauge
OT	On Time
OTG	Oil Temperature Gauge
OTP	On Top
OTS	Out Of Service
OXY	Oxygen - see O_2

P

P-factor	Asymmetric Propeller Loading
PA	Pivotal Altitude
PA	Precision Approach
PA	Pressure Altitude
PAJA	Parachute Jumping Activities
PAPI	Precision Approach Path Indicator
PAR	Precision Approach Radar
PAT	Pattern
PATWAS	Pilot's Automatic Telephone Weather Answering Service
PAX	Passenger
PCATD	Personal Computer Based Aviation Training Device
PCK	Pilot Check
PCPN	Precipitation
PIC	Pilot In Command
PIR	Precision Instrument Runway
PIREP	Pilot's Weather Report (UA)
PIT	Pilot Instructor Training
PLA	Practice Low Approach
PN	Prior Notice Required
PNR	Point Of No Return
POA	Privately Owned Aircraft
POB	Persons On Board
POH	Pilot's Operating Handbook
PPH	Pounds Per Hour (Fuel)
PPI	Plan Position Indicator
PPO	Prior Permission Only
PPR	Prior Permission Required
PROP	Propeller
PSBT	Pilot Self-Briefing Terminal
PSGR	Passenger/s
PSI	Pounds Per Square Inch
PSNRP	Position Report
PT	Procedure Turn
PTS	Practical Test Standards (FAA)
PTT	Push To Talk
PVT	Private
PWB	Pilot Weather Briefing
PWI	Proximity Warning Indicator

Q

QDM	Bearing To Facility
QDR	Bearing From Facility
QFE	Altitude Above Ground Based On Station Pressure
QNE	Altimeter Setting 29.92 inches Hg.
QNH	Altitude Above Sea Level Based On Station Pressure
QSY	Change Radio Frequency Now To....

R

RAC	Request Altitude Change
RADAR	Radio Detection And Ranging
RAGF	Remote Air-Ground Facility
RAI	Runway Alignment Indicator
RAIL	Runway Alignment Indicator Light System
RAREP	Radar Report (Weather)
RB	Right Base
RBN	Radio Beacon
RC	Reverse Course
RCA	Reach Cruising Altitude
RCAG	Remote Communication Air/Ground Facility
RCLM	Runway Centerline Marking
RCLS	Runway Centerline Light System
RCO	Remote Communications Outlet
RDL	Radial
RDO	Radio
RDS	Radius
REF	Reference
REG	Regulation
REIL	Runway End Identification Lights
REOC	Report When Established On Course
REP	Report
RF	Radio Frequency
RFSS	Remote FSS
RMI	Radio Magnetic Indicator
RNAV	Area Navigation
ROC	Rate Of Climb
ROD	Rate Of Descent
ROT	Rule Of Thumb
ROV	Report Over
RP	Right Traffic Pattern
RPA	Request Present Altitude
RPM	Revolutions Per Minute (Propeller)
RPRT	Report
RR	Low or Medium Frequency Radio Range Station
RRL	Runway Remaining Lights
RRP	Runway Reference Point
RSCD	Runway Surface Condition
RSTR	Restrict
RSVN	Reservation
RT	Right Turn After Take-Off
RTO	Rejected Takeoff
RTR	Remote Transmitter/Receiver
RTR	Return To Ramp
RTS	Return To Service
RV	Radar Vector
RVO	Runway Visibility By Observer
RVR	Runway Visual Range As Measured At TDZ
RVV	Runway Visibility Value
RWY	Runway

S

SA	Surveillance Approach
SAC	Sectional Aeronautical Chart (1 inch = 6.86 nm)
SAC	Strategic Air Command
SAE	Society Of Automotive Engineers
SALS	Short Approach Light System
SAR	Search and Rescue
SARAH	Search and Rescue Homing
SDBY	Stand By
SDF	Simplified Directional Facility
SEL	Single-Engine Land
SES	Single-Engine Sea
SFC	Surface
SFL	Sequenced Flashing Light System
SGL	Single
SHORAN	Short Range Navigation
SHP	Shaft Horse Power
SHP	Standard Holding Procedure
SHTDN	Shutdown
SI	Straight-In Approach
SIA	Standard Instrument Approach
SIAP	Standard Instrument Approach Procedure
SID	Standard Instrument Departure (Procedure)
SIGMET	Significant Meteorological Information
SIGMET	Weather Advisory-Severe and Extreme
SIM	Simulated Approach
SIM	Simulator
SL	Sea Level
SLR	Slush On Runway
SM	Statute Mile
SMOH	Since Major Overhaul
SOAP	Spectrometric Oil Analysis Program
SOB	Souls On Board
SOP	Standard Operating Procedure(s)
SPB	Seaplane Base
SPD	Speed
SPOH	Since Propeller Overhaul
SPOT	Special Purpose Operational Training
SQK	Squawk
SR	Sunrise
SRA	Surveillance Radar Approach
SS	Sunset
SSALS	Simplified Short Approach Light System
STA	Straight-In Approach
STAR	Standard Terminal Arrival (Procedure)
STC	Supplemental Type Certificate (FAA)
STD	Standard
STOH	Since Top Overhaul
STOL	Short Takeoff and Landing
SUA	Special Use Airspace
SVC	Service
SVFR	Special VFR
SWAP	Severe Weather Avoidance Plan
SYNS	Synopsis

T

°T	Degrees Of Temperature
T	Teletype (Obsolete)
T	Training
T	True (After a Bearing)
TA	Total Aboard
TABS	Telephone Automated Briefing Service
TAC	Tactical Air Command
TAC	Terminal Area Chart
TACAN	Tactical Air Navigation
TACH	Tachometer (Engine)
TAF	Aerodrome Forecast
TAR	Terminal Area Surveillance Radar
TAS	True Airspeed
TASR	Terminal Area Surveillance Radar
TBO	Time Between Overhauls
TC	Time Check
TC	True Course
TC	Turn Coordinator
TC	Type Certificate
TCA	Terminal Control Area (Now Class A Airspace)
TCAS	Traffic Alert and Collision Avoidance System
TCDS	Type Certificate Data Sheet
TCH	Threshold Crossing Height
TD	Touchdown
TDWR	Terminal Doppler Weather Radar
TDZ	Touchdown Zone (Runway)
TDZE	Touchdown Zone Elevation
TDZL	Touchdown Zone Lights
TEC	Tower En Route Control
TEL	Telephone
TEMP	Temperature

Glossary Of Abbreviations, Acronyms, Definitions, and Contractions

TERPS	Terminal Instruments Procedures
TF	Terrain Following
TFC	Traffic
TFR	Temporary Flight Restrictions
TGL	Touch-And-Go Landing
TH	True Heading
THR	Threshold
TIA	Type Inspection Authorization
TIAS	True Indicated Air Speed
TKOF	Takeoff
TN	True North
TOC	Takeoff Check
TOC	Top Of Climb
TOVC	Top Of Overcast
TPA	Traffic Pattern Altitude
TR	Track
TRNG	Training
TRSA	Terminal Radar Service Area
TRSP	Transponder
TSMTR	Transmitter
TSO	Technical Standard Order
TSR	Terminal Surveillance Radar
TT	Total Time
TUC	Time Of Useful Consciousness
TVOR	Terminal VOR
TWEB	Transcribed Weather Broadcast
TWR	Tower
TWY	Taxiway
TXG	Taxiway

U

U	Unicom
U (UA)	Urgent Pilots Weather Reports
UA	Pilots Weather Reports (PIREP)
UAA	University Aviation Association
UC	Under Construction
UCLT	Until Cleared To Land By The Tower
UDDF	Up And Downdrafts
UFA	Until Further Advised
UFN	Until Further Notice
UHA	Unable Higher Altitude
UHF	Ultra High Frequency
UM	Unable To Maintain
UNAVBL	Unavailable
UNICOM	Aeronautical Advisory Stations (Radio)
UNICOM	Universal Communications
UNTC	Unable To Establish Contact
UNUSBL	Unusable
USGPO	United States Government Printing Office
USWB	U.S. Weather Bureau
UT	Universal Time
UTC	Coordinated Universal Time (ZULU/GMT)

V

V_1	Takeoff Decision Speed
V_2	Takeoff Safety Speed
$V_{2\ MIN}$	Minimum Takeoff Safety Speed
V_A	Design Maneuvering Speed
VAC	Visual Approach Chart
VAR	Variation (Magnetic)
VASI	Visual Approach Slope Indicator
V_B	Design Speed For Maximum Gust Intensity
V_C	Design Cruising Speed
V_D	Design Diving Speed
V_{DF}/M_{DF}	Demonstrated Flight Diving Speed
VDP	Visual Descent Point
VEOG	VFR Exam-O-Grams
V_F	Design Flap Speed
VF	Maintaining Visual Flight (Special VFR)
V_{FC}/M_{FC}	Maximum Speed For Stability Characteristics
V_{FE}	Maximum Flap Extended Speed
VFR	Ceiling > 3000' and Visibility > 5 Miles
VFR	Visual Flight Rules
V_H	Maximum Speed In Level Flight With Maximum Continuous Power
VHF	Very High Frequency
VIA	By Way Of
VICE	Instead/Versus
VIS	Visibility
VLE	Maximum Landing Gear Extended Speed
V_{LO}	Maximum Landing Gear Operating Speed
V_{LOF}	Lift-Off Speed
V_{MC}	Minimum Control Speed - Critical Engine Out
VMC	Visual Meteorological Conditions (VFR)
$V_{MD\ DRAG}$	Maximum Glide Speed
V_{NO}/M_{NO}	Maximum Operating Limit Speed
V_{MU}	Minimum Unstick Speed
V_{NE}	Never-Exceed Speed
V_{NO}	Maximum Structural Cruising Speed
VOLMET	Meteorological Information for Aircraft in Flight
VOR	Very High Frequency Omnidirectional Radio Range
VOR-DME	VOR With Collocated DME
VORTAC	Collocated VOR and TACAN
VOT	VOR Test Signal
V_R	Rotation Speed
VR	VFR Military Training Routes
VR	Visual reference, flight by
V_S	Stalling Speed Or Minimum speed at which the airplane is controllable
vs.	Versus
V_{S1}	Stalling Speed Or In A Specified Configuration
VSB	Visible
VSI	Vertical Speed Indicator
V_{SO}	Stalling Speed In The Landing Configuration
VSPI	Visual Glidepath Indicator
VTOL	Vertical Take-off and Landing
V_X	Speed For Best Angle Of Climb
V_Y	Speed For Best Rate Of Climb

W

WA	AIRMET Weather Advisory-Warning Light Aircraft
WAC	World Aeronautical Chart (1 inch = 13.7 nm)
WCA	Wind Correction Angle
WDI	Wind Direction Indicator
WEA/WX	Weather
WILCO	Will Comply
WND	Wind
WP/WPT	Waypoint
WS	SIGMET Significant Meteorological Information
WS	Wind Shear
WSR	Wet Snow on Runway/s
WT	Weight
WTR	Water on Runway/s
WW	Severe Weather Forecast
WX	Weather
XW	Crosswind

XYZ

Z	Zulu Time (UTC/GMT)
ZM	VHF Station Location (Z)
ZULU	GMT/UTC (24 Hour Clock System)

ICAO WEATHER FORMATS METAR/TAF

ABBREVIATIONS

AO1	Automated Observation Without Precipitation Discriminator (Rain/Snow)
AO2	Automated Observation With Precipitation Discriminator (Rain/Snow)
AMD	Amended Forecast (TAF)
BECMG	Becoming (Expected Between 2 Digit Beginning Hour And 2 Digit Ending Hour)
BKN	Broken 5-7 Octas (Eighths) Cloud Coverage
CLR	Clear At Or Below 12,000 Feet (ASOS/AWOS Report)
COR	Correction To The Observation
FEW	>0-2 Octas (Eights) Cloud Coverage
FM	From (4 Digit Beginning Time In Hours And Minutes)
LDG	Landing
M	In Temperature Field Means "Minus" Or Below Zero
M	In RVR Listing Indicates Visibility Less Than Lowest Reportable Sensor Value (e.g. M0600)
NO	Not Available (e.g. SLPNO, RVRNO)
NSW	No Significant Weather Note: NSW Only Indicates Obstruction To Visibility Or Precipitation Previously Noted Has Ended. Low Ceilings, Wind Shear, And Other Weather Conditions May Still Exist
OVC	Overcast 8 Octas (Eighths) Cloud Coverage
P	In RVR Indicates Visibility Greater Than Highest Reportable Sensor Value (e.g. P6000FT)
P6SM	Visibility Greater Than 6 SM (TAF Only) (ICAO)
PK WND	Peak Wind
PROB40	Probability 40 Percent
R	Runway (Used In RVR Measurement)
RMK	Remark
RY/RWY	Runway
SCT	Scattered 3-4 Octas (Eighths) Cloud Coverage
SKC	Sky Clear
SLP	Sea Level Pressure (e.g. 1001.3 Reported As 013)
SM	Statute mile(s)
SPECI	Special Report
TEMPO	Temporary Changes Expected (Between 2 Digit Beginning Hour And 2 Digit Ending Hour)
TKOF	Takeoff
V	Varies (Wind Direction And RVR)
VC	Vicinity
VRB	Variable Wind Direction When Speed Is Less Than Or Equal To 6 Knots
W	Vertical Visibility (Indefinite Ceiling)
WS	Wind Shear (In TAFs, Low Level And Not Associated With Convective Activity)

DESCRIPTORS

BC	Patches
BL	Blowing
DR	Low Drifting
FZ	Supercooled/freezing
MI	Shallow
PR	Partial
SH	Showers
TS	Thunderstorm

WEATHER PHENOMENA

BR	Mist
DS	Dust Storm
DU	Widespread Dust
DZ	Drizzle
FC	Funnel Cloud
+FC	Tornado/Water Spout
FG	Fog
FU	Smoke
GR	Hail
GS	Small Hail/Snow Pellets
HZ	Haze
IC	Ice Crystals
PE	Ice Pellets
PO	Dust/Sand Whirls
PY	Spray
RA	Rain
SA	Sand
SG	Snow Grains
SN	Snow
SQ	Squall
SS	Sandstorm
UP	Unknown Precipitation
VA	Volcanic Ash

CLOUD TYPES

CB	Cumulonimbus
TCU	Towering Cumulus

INTENSITY VALUES

–	Light
+	Heavy

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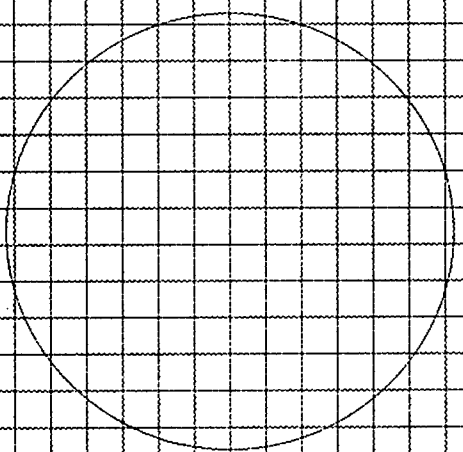
I have come to regard a good book as curtailed of half its value if it has not a pretty full index. It is almost impossible without such a guide to reproduce on demand the most striking thoughts or facts the book contains, whether for citation or further consideration.

Horace Binney

Flight Notes



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AIRSPACE REQUIREMENTS

CLASS B AIRSPACE

1. ATC clearance
2. Establish and maintain radio communications with ATC.
3. Operational Mode C transponder
4. Private pilot certification or student pilot authorization, see Title 14 of the Code of Federal Regulations § 61.95.

CLASS C AIRSPACE

1. Establish and maintain radio communications with ATC
2. Operational Mode C transponder

CLASS D AIRSPACE

1. Establish and maintain radio communications with ATC.

AVIATION FUEL

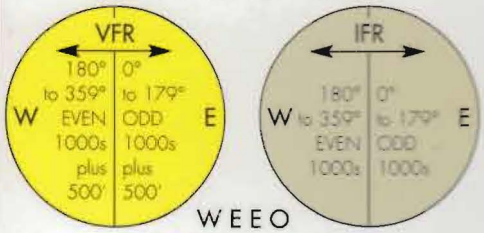
OCTANE	COLOR
80/87	Red
100LL	Blue
100/130	Green
115/145	Purple
Jet A	Clear

TIME CONVERSION
– TO ZULU OR UTC –

STANDARD		SAVINGS	
EST	+5	EST	+4
CST	+6	CST	+5
MST	+7	MST	+6
PST	+8	PST	+7
Alaska	+9	Alaska	+8
Hawaii	+10		

HEMISPHERIC TRAFFIC RULE

Above 3000' AGL / MC – Ground Track



WEEO

West is EVEN – East is ODD

STANDARD LAPSE RATE

2° C (3.5° F) Per 1000 Feet Increase In Altitude

A	•–	Alfa
B	–•••	Bravo
C	–•–•	Charlie
D	–••	Delta
E	•	Echo
F	••–•	Foxtrot
G	––•	Golf
H	••••	Hotel
I	••	India
J	•–––	Juliett
K	–•–	Kilo
L	•–••	Lima
M	––	Mike
N	–•	November
O	–––	Oscar
P	•––•	Papa
Q	––•–	Quebec
R	•–•	Romeo
S	•••	Sierra
T	–	Tango
U	••–	Uniform
V	•••–	Victor
W	•––	Whiskey
X	–••–	Xray
Y	–•––	Yankee
Z	––••	Zulu

ATCT LIGHT GUN SIGNALS

COLOR SIGNAL	AIRCRAFT ON THE GROUND	AIRCRAFT IN FLIGHT
■	Cleared For Takeoff	Cleared To Land
●●●●●●	Cleared For Taxi	Return For Landing (To Be Followed By Steady Green At Proper Time)
■	Stop	Give Way To Other Aircraft and Continue Circling
●●●●●●	Taxi Clear Of The Runway	Airport Unsafe, Do Not Land
●●●●●●	Return To Start	Not Applicable
●●●●●●		

GENERAL CHECKLIST

BEFORE STARTING ENGINE

1. Visual Inspection – Per AFM Or POH
2. Seat Safety Belt(s) – On
3. Parking Brake – As Required
4. Controls – Free
5. Carburetor Air – Cold (Off)
6. Propeller – Hi RPM
7. Mixture – Full Rich
8. Fuel – On – Check Quantity
9. Electric Switches – Checked
10. Cowl Flaps – Open
11. Clear Propeller Area Visually
12. Master Switch (Bat. & Gen.) On
13. Ignition Switch - On Both Magnetos
14. Start Engine – Per AFM Or POH

BEFORE TAKEOFF

1. Instruments - Checked and Set
2. Fuel - Proper Tank(s)
3. Trim Tab(s) Set For Takeoff
4. Propeller – Exercise and Set Hi RPM
5. Engine Check – Both Magnetos
   Oil Pressure and Temperature
   Carburetor Air Check For Ice
6. Carburetor Air - Set Cold Off
7. Flaps – As Required
8. Controls – Operate & Check Visually
9. Seat Locked and Belts Secured
10. Windows and Doors – Checked
11. Clear Runway and Area
12. Clearance For Takeoff

FLIGHT PLAN SEQU

- 1. Type Of Flight Plan – VF
- 2. Aircraft Identification -
- 3. Aircraft Type & Specia
- 4. True Airspeed (Knots)
- 5. Departure Point
- 6. Departure Time - (ZULU) – ETD
- 7. Cruising Altitude
- 8. Route Of Flight
- 9. Destination Airport Identifier
- 10. Estimated Time En Route – ETE
- 11. Remarks Or Special Request
- 12. Fuel On Board - Hours and Minutes
- 13. Alternate Airport(s)
- 14. Pilot's Name and Aircraft Home Base
- 15. Number Of Souls On Board
- 16. Color(s) Of Aircraft

- Loss Or Impai
- Unforecasted Weather
- Hazardous Conditions

WHEN NOT IN RADAR CONTACT:

- Compulsory Reporting Point(s)
- Fix Name In Off-Airways Routing
- Reaching An Assigned Holding Fix
- Departing An Assigned Holding Fix
- Final Approach Fix

AIR NAVIGATION FORMULAS

- True Course ± Wind Correction Angle = True Heading
  (add WCA when from right; or subtract WCA when from left)
- True Heading ± Variation = Magnetic Heading
- Magnetic Heading ± Deviation = Compass Heading
  TC ± WCA = TH ± Var = MH ± Deviation = CH
- True Course ± Variation = Magnetic Course
  TC ± Variation = MC

- Time = $\frac{\text{distance}}{\text{ground speed}}$
- Distance = ground speed X time
- Ground Speed = $\frac{\text{distance}}{\text{time}}$
- Converting minutes to tenths of an hour: 6 minutes = 0.1 hour

EQUIPMENT CODE

SPECIAL EQUIPMENT	NO TRSP.	NON-ALTITUDE REPORTING	ALTITUDE REPORTING
NONE	X	T	U
DME	D	B	A
TACAN	M	N	P
RNAV	W	C	R
GPS – G		FMS – E	

TRANSPONDER CODES

0000 . . . . . Never Use
1200 . . . . . VFR Operations
7500 . . . . . Hijacked
7600 . . . . . Lost Communications
7700 . . . . . Emergency

CONVERSION TABLES

MILLIBARS TO INCHES OF HG

1026.1	30.30
1022.7	30.20
1019.3	30.10
1015.9	30.00
1013.2 (standard atmosphere)	29.92
1012.5	29.90
1009.1	29.80
1005.7	29.70
1002.3	29.60

SPEED

1 ft./sec. = 60 ft./min. = 3,600 ft./hr.
1 mi./hr. = 88 ft./min. = 1.46 ft./sec.
1knot = 101.288 ft./min. = 1.688 ft./sec.

TEMPERATURE

° F = C X 9/5 + 32
° C = 5/9 (° F –32)

EXAMPLE

10° C X 1.80 = 18 +32 = 50° Fahrenheit
60° F –32 = 28 X .5555 = 15.5° Celsius

WEIGHTS

1 gallon of gasoline = ... 6.0 lbs.
1 gallon of oil = ... 7.5 lbs.
1 gallon of kerosene = ... 6.75 lbs.
1 gallon of methanol = ... 6.62 lbs.
1 gallon of water = ... 8.33 lbs.

U.S. GALLONS

1 U.S. gallon = .83268 imperial gallon
1 gallon = 231 cubic inches = 0.134 cubic feet = 3.785 liters.
1 cubic foot = 7.5 U.S. gallons

MILEAGE

1 nautical mile (6,076') = 1.15 statute mile
1 statute mile (5,280') = 0.87 nautical mile
1 kilometer (3,280.8') = .62137 statute mile or .54 nautical mile

AERONAUTICAL CHART SCALES

Sectional: . . . . . 8 sm or 7 nm per inch
WAC/ONC: . . . . . 16 sm or 14 nm per inch

ICAO WEATHER METAR/TAF CODES

REPORTS

METAR = Aviation Routine Weather Report
TAF = Terminal Aerodrome Forecast

DESCRIPTORS

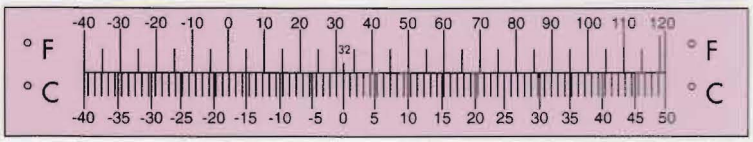
BC - Patches
BL - Blowing
DR - Low Drifting
FZ - Supercooled/Freezing
MI - Shallow
PR - Partial
SH - Showers
TS - Thunderstorm

WEATHER PHENOMENA

BR - Mist
DS - Dust Storm
DU - Widespread Dust
DZ - Drizzle
FC - Funnel Cloud
+FC - Tornado/Water Spout
FG - Fog
FU - Smoke
GR - Hail
GS - Small Hail/Snow Pellets
HZ - Haze
IC - Ice Crystals
PL - Ice Pellets
PO - Dust/Sand Whirls
PY - Spray
RA - Rain
SA - Sand
SG - Snow Grains
SN - Snow
SQ - Squall
SS - Sandstorm
UP - Unknown Precipitation
VA - Volcanic Ash

CLOUD TYPES

CB - Cumulonimbus
TCU - Towering Cumulus



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