

Instrument Flying Handbook



Instrument Flying Handbook

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Preface

This Instrument Flying Handbook is designed for use by instrument flight instructors and pilots preparing for instrument rating tests. Instructors may find this handbook a valuable training aid as it includes basic reference material for knowledge testing and instrument flight training. Other Federal Aviation Administration (FAA) publications should be consulted for more detailed information on related topics.

This handbook conforms to pilot training and certification concepts established by the FAA. There are different ways of teaching, as well as performing, flight procedures and maneuvers and many variations in the explanations of aerodynamic theories and principles. This handbook adopts selected methods and concepts for instrument flying. The discussion and explanations reflect the most commonly used practices and principles. Occasionally the word “must” or similar language is used where the desired action is deemed critical. The use of such language is not intended to add to, interpret, or relieve a duty imposed by Title 14 of the Code of Federal Regulations (14 CFR).

All of the aeronautical knowledge and skills required to operate in instrument meteorological conditions (IMC) are detailed. Chapters are dedicated to human and aerodynamic factors affecting instrument flight, the flight instruments, attitude instrument flying for airplanes, basic flight maneuvers used in IMC, attitude instrument flying for helicopters, navigation systems, the National Airspace System (NAS), the air traffic control (ATC) system, instrument flight rules (IFR) flight procedures, and IFR emergencies. Clearance shorthand and an integrated instrument lesson guide are also included.

This handbook supersedes FAA-H-8081-15A, Instrument Flying Handbook, dated 2007.

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<http://bookstore.gpo.gov>

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Page 2-3, correction to paragraph concerning induced drag.

Page 2-7, corrections made to Figure 2-8. Thrust and Power Required Curves.

Page 2-11, correction to paragraph concerning the coordination of rudder and aileron controls.

Page 2-12, correction to Figure 2-15. Adverse Yaw.

Page 3-4, correction to Figure 3-3. Sensitive Altimeter Components.

Page 3-5, correction to Figure 3-6. The loss of altitude experienced when flying into an area where the air is colder (more dense) than standard.

Page 4-2, correction to Figure 4-1. Control Instruments.

Page 4-3, correction to Figure 4-2. Performance Instruments.

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Page 6-12, correction to Figure 6-13. Flight Instrument Indications in a Stabilized Constant-Rate Climb.

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Introduction

Is an Instrument Rating Necessary?

The answer to this question depends entirely upon individual needs. Pilots may not need an instrument rating if they fly in familiar uncongested areas, stay continually alert to weather developments, and accept an alternative to their original plan. However, some cross-country destinations may take a pilot to unfamiliar airports and/or through high activity areas in marginal visual or instrument meteorological conditions (IMC). Under these conditions, an instrument rating may be an alternative to rerouting, rescheduling, or canceling a flight. Many accidents are the result of pilots who lack the necessary skills or equipment to fly in marginal visual meteorological conditions (VMC) or IMC and attempt flight without outside references.

Pilots originally flew aircraft strictly by sight, sound, and feel while comparing the aircraft's attitude to the natural horizon. As aircraft performance increased, pilots required more inflight information to enhance the safe operation of their aircraft. This information has ranged from a string tied to a wing strut, to development of sophisticated electronic flight information systems (EFIS) and flight management systems (FMS). Interpretation of the instruments and aircraft control have advanced from the "one, two, three" or "needle, ball, and airspeed" system to the use of "attitude instrument flying" techniques.

Navigation began by using ground references with dead reckoning and has led to the development of electronic navigation systems. These include the automatic direction finder (ADF), very-high frequency omnidirectional range (VOR), distance measuring equipment (DME), tactical air navigation (TACAN), long range navigation (LORAN), global positioning system (GPS), instrument landing system (ILS), microwave landing system (MLS), and inertial navigation system (INS).

Perhaps you want an instrument rating for the same basic reason you learned to fly in the first place—because you like flying. Maintaining and extending your proficiency, once you have the rating, means less reliance on chance and more on skill and knowledge. Earn the rating—not because you might

need it sometime, but because it represents achievement and provides training you will use continually and build upon as long as you fly. But most importantly it means greater safety in flying.

Instrument Rating Requirements

A private or commercial pilot must have an instrument rating and meet the appropriate currency requirements if that pilot operates an aircraft using an instrument flight rules (IFR) flight plan in conditions less than the minimums prescribed for visual flight rules (VFR), or in any flight in Class A airspace.

You will need to carefully review the aeronautical knowledge and experience requirements for the instrument rating as outlined in Title 14 of the Code of Federal Regulations (14 CFR) part 61. After completing the Federal Aviation Administration (FAA) Knowledge Test issued for the instrument rating, and all the experience requirements have been satisfied, you are eligible to take the practical test. The regulations specify minimum total and pilot-in-command time requirements. This minimum applies to all applicants regardless of ability or previous aviation experience.

Training for the Instrument Rating

A person who wishes to add the instrument rating to his or her pilot certificate must first make commitments of time, money, and quality of training. There are many combinations of training methods available. Independent studies may be adequate preparation to pass the required FAA Knowledge Test for the instrument rating. Occasional periods of ground and flight instruction may provide the skills necessary to pass the required test. Or, individuals may choose a training facility that provides comprehensive aviation education and the training necessary to ensure the pilot will pass all the required tests and operate safely in the National Airspace System (NAS). The aeronautical knowledge may be administered by educational institutions, aviation-oriented schools, correspondence courses, and appropriately rated instructors. Each person must decide for themselves which training program best meets his or her needs and at the same time maintain a high quality of training. Interested persons

should make inquiries regarding the available training at nearby airports, training facilities, in aviation publications, and through the FAA Flight Standards District Office (FSDO).

Although the regulations specify minimum requirements, the amount of instructional time needed is determined not by the regulation, but by the individual's ability to achieve a satisfactory level of proficiency. A professional pilot with diversified flying experience may easily attain a satisfactory level of proficiency in the minimum time required by regulation. Your own time requirements will depend upon a variety of factors, including previous flying experience, rate of learning, basic ability, frequency of flight training, type of aircraft flown, quality of ground school training, and quality of flight instruction, to name a few. The total instructional time you will need, the scheduling of such time, is up to the individual most qualified to judge your proficiency—the instructor who supervises your progress and endorses your record of flight training.

You can accelerate and enrich much of your training by informal study. An increasing number of visual aids and programmed instrument courses is available. The best course is one that includes a well-integrated flight and ground school curriculum. The sequential nature of the learning process requires that each element of knowledge and skill be learned and applied in the right manner at the right time.

Part of your instrument training may utilize a flight simulator, flight training device, or a personal computer-based aviation training device (PCATD). This ground-based flight training equipment is a valuable tool for developing your instrument cross-check and learning procedures, such as intercepting and tracking, holding patterns, and instrument approaches. Once these concepts are fully understood, you can then continue with inflight training and refine these techniques for full transference of your new knowledge and skills.

Holding the instrument rating does not necessarily make you a competent all-weather pilot. The rating certifies only that you have complied with the minimum experience requirements, that you can plan and execute a flight under IFR, that you can execute basic instrument maneuvers, and that you have shown acceptable skill and judgment in performing these activities. Your instrument rating permits you to fly into

instrument weather conditions with no previous instrument weather experience. Your instrument rating is issued on the assumption that you have the good judgment to avoid situations beyond your capabilities. The instrument training program you undertake should help you to develop not only essential flying skills but also the judgment necessary to use the skills within your own limits.

Regardless of the method of training selected, the curriculum in Appendix B, Instrument Training Lesson Guide, provides guidance as to the minimum training required for the addition of an instrument rating to a private or commercial pilot certificate.

Maintaining the Instrument Rating

Once you hold the instrument rating, you may not act as pilot-in-command under IFR or in weather conditions less than the minimums prescribed for VFR, unless you meet the recent flight experience requirements outlined in 14 CFR part 61. These procedures must be accomplished within the preceding 6 months and include six instrument approaches, holding procedures, and intercepting and tracking courses through the use of navigation systems. If you do not meet the experience requirements during these 6 months, you have another 6 months to meet these minimums. If the requirements are still not met, you must pass an instrument proficiency check, which is an inflight evaluation by a qualified instrument flight instructor using tasks outlined in the instrument rating practical test standards (PTS).

The instrument currency requirements must be accomplished under actual or simulated instrument conditions. You may log instrument flight time during the time for which you control the aircraft solely by reference to the instruments. This can be accomplished by wearing a view-limiting device, such as a hood, flying an approved flight-training device, or flying in actual IMC.

It takes only one harrowing experience to clarify the distinction between minimum practical knowledge and a thorough understanding of how to apply the procedures and techniques used in instrument flight. Your instrument training is never complete; it is adequate when you have absorbed every foreseeable detail of knowledge and skill to ensure a solution will be available if and when you need it.

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