Cancelled See 61-5T

Federal Aviation Agency

AC NO: AC 61-5

ADVISORY CIRCULAR

HELICOPTER PILOT EXAMINATION GUIDE

- PRIVATE
- COMMERCIAL
- FLIGHT INSTRUCTOR

NOVEMBER 1, 1963

Federal Aviation Agency

ADVISORY CIRCULAR

AC NO:	AC 61-5
	AIRMEN
EFFECTIVE:	11/1/63

SUBJECT: HELICOPTER PILOT EXAMINATION GUIDE - PRIVATE, COMMERCIAL, AND FLIGHT INSTRUCTOR

---

1. PURPOSE. This circular announces the availability to the public of the Helicopter Pilot Examination Guide, Private, Commercial, and Flight Instructor.

2. DESCRIPTION OF THE PUBLICATION. This guide (1) outlines the scope and narrows the field for study, insofar as possible, to the basic knowledge "need-to-know" requirements for the helicopter pilot, and (2) acquaints the applicant with source material that may be used to acquire this basic knowledge. It is applicable to the private pilot, commercial pilot, or flight instructor.

3. HOW TO GET THIS PUBLICATION.

   a. Copies of this publication are available at:

      FAA General Aviation District Offices

   b. Copies of this publication may be ordered from:

      Office of Headquarters Operation, HQ-438
      Federal Aviation Agency
      Washington, D. C. 20553

   c. Identify the publication in your order as:

      FAA Advisory Circular AC No. 61-5
      Helicopter Pilot Examination Guide

   d. There is no charge for this publication.

For George S. Moore
Director
Flight Standards Service

TABLE OF CONTENTS

CHAPTER 1. NATURE OF THE HELICOPTER WRITTEN EXAMINATIONS

1. PRIVATE PILOT AND COMMERCIAL PILOT EXAMINATIONS. These examinations portray, in "scenario" fashion, a typical cross-country flight. The questions posed are those which relate to a successfully planned and executed flight. The pilot employs all pertinent flight information in planning his trip and then applies his knowledge of air traffic rules, weather, navigation, radio, operation of aircraft and engines, etc., insofar as it contributes to safe, efficient flight. Recognizing this functional approach, the examinations are designed to integrate technical information of the several subject areas into test items of a single section.

2. FLIGHT INSTRUCTOR EXAMINATION. The flight instructor written examination is necessarily comprehensive since the flight instructor must be knowledgeable in many areas. He must know not only "what" to do and "how" to do it; he must know also "why" a maneuver is performed in a certain way or a procedure is performed in a certain order, and what the results may be if the maneuver or procedure is not performed properly. He must be well-grounded in the fundamentals of aeronautical knowledge for the instructor rating that he holds or for which he is a candidate. In addition, the flight instructor must be knowledgeable in one highly important area which is not required for any other pilot certificate. He must be a teacher. Therefore, he must have an understanding of the learning processes, basic teaching principles, and the general application of these principles to most effectively promote learning. The examination is divided into two sections. Section 1 is entitled "Fundamentals of Flight Instruction"; Section 2 is entitled "Performance and Analysis of Flight Training Maneuvers."

3. TYPE OF EXAMINATION QUESTIONS. Examination questions are of the objective, multiple-choice type, and each can be answered by the selection of a single item as the correct choice. This method conserves the applicant's time, saves time in scoring, and eliminates the element of individual judgment in determining grades. The applicant's answers are marked upon a special answer sheet which is graded on an electric scoring machine. In the past, some applicants who received failing grades have felt that a mechanical defect in the scoring machine might have been the cause. As a double check, all papers receiving grades below passing are hand-scored for verification before the results are mailed to the applicant.

CHAPTER 2. STUDY OUTLINE FOR THE PRIVATE AND COMMERCIAL PILOT HELICOPTER WRITTEN EXAMINATIONS

4. INTRODUCTION. The study outline for the private and commercial pilot written examinations is given as a single unit. Those areas on which only the commercial pilot is tested are either referenced by the parenthetical expression "commercial pilot" or by a brief explanatory sentence giving the difference between the coverage on the private and commercial pilot examinations. The principal difference between the examination coverage on those items of the outline common to both the private and commercial pilot is the complexity and depth of the question, i.e., the number and level of difficulty of the elements that must be pulled together to arrive at a solution.

SECTION 1. BASIC AERONAUTICAL KNOWLEDGE

5. WEATHER. You should be familiar with the following:

a. Basic concepts of the earth's atmosphere and atmospheric pressure.

b. Types of clouds and commonly associated weather phenomena.

c. Wind circulation, "highs" and "lows."

d. Humidity, temperature and dewpoint, and their significance to pilots.

e. Air masses.

f. Fronts and frontal weather (weather conditions generally associated with cold fronts, warm fronts, occluded fronts, etc.).

g. Meteorological terminology (definitions).

h. Weather hazards.

(1) Thunderstorms and hail.

(2) Turbulence.

(3) Icing.

(4) Fog and other visibility obscurations.

(5) Mountain waves.

6. NAVIGATION. You should have an understanding of the following:

   a. The earth and its coordinates (latitude and longitude).

   b. Chart projections used for air navigation (with emphasis on the properties of the Lambert Conformal Conic Projection).

   c. Aeronautical chart reading (sectional chart will be used on the examinations).

   d. Dead reckoning. (Wind triangle solutions will be limited to the type where the forecast wind, true airspeed, and true course are known.)

   e. Pilotage.

   f. Radio navigation (as it pertains to VFR flight).

   g. Navigation terminology (definition of terms).

   h. Vital relationship between weather phenomena and problems of navigation.

7. AERODYNAMICS AND PRINCIPLES OF FLIGHT. You should demonstrate a knowledge of the following:

   a. Terminology and definitions.

   b. Stability.

   c. Helicopter performance and factors affecting performance (with emphasis on the effect of density altitude on performance).

   d. Forces acting on a helicopter.

8. AIRCRAFT AND ENGINE OPERATION. You should have a working knowledge of the following as they relate to safe flight operations and general safety practices:

   a. Control system.

   b. Fuel and fuel system.

   c. Oil and oil system.

   d. Electrical system.

   e. Reciprocating engine principles and components.

   f. Carburetion.

g. Ignition system.

h. Rotor system -- single main rotor and **antitorque** (tail) rotor.

i. Engine instruments.

j. Engine controls (throttle, collective, mixture, carburetor heat, etc.)

k. Clutch system.

l. **Freewheeling unit.**

9. RADIO EQUIPMENT. You should understand the basic characteristics, operations, frequency ranges, advantages, and limitations of the following:

a. VHF communications equipment.

(1) The "line-of-sight" range of transmissions.

(2) How to utilize VHF/DF (direction finding) service and radar assistance from ground stations.

b. VOR equipment.

(1) Be able to recognize a usable signal.

(2) Know the components of the VOR receiver.

(3) Understand that a radial is a line of magnetic bearing extending from a VOR station.

(4) Understand how to determine your approximate position relative to the station by interpreting the setting of the bearing (or course) selector, the position of the LEFT-RIGHT needle, and the indication of the TO-FROM indicator.

c. L/MF Range and ADF.

(1) By referring to the aeronautical chart, be able to determine the magnetic directions of the four legs of low frequency ranges and the relative positions of the "A" and "N" quadrants.

(2) Understand how to check position along course by use of the range station and range legs.

(3) Understand how to interpret bearing information when using your ADF.

10. INSTRUMENTS. You should understand the basic principles of operation and characteristics of the following instruments:

a. Bowl magnetic compass.

(1) Deviation.

(2) Oscillation error.

(3) Magnetic dip error -- this error is responsible for

(a) northerly turn error which is most pronounced on northerly and southerly headings; and

(b) acceleration error which is most pronounced on easterly and westerly headings.

(4) Understand that, in general, to obtain a correct reading from the magnetic compass, the aircraft must be in straight-and-level flight with the compass holding steady.

b. Altimeter (sensitive altimeter adjustable for changes in barometric pressure).

(1) Know the effect of nonstandard temperature and pressure on the indications of the altimeter.

(2) Understand how to apply altimeter settings to the altimeter-setting window of the altimeter.

(3) Be able to interpret the indications of the altimeter at all altitudes.

(4) Know how to obtain pressure altitude on the altimeter.

c. Airspeed indicator. Know the significance of the red line on the airspeed indicator.

SECTION 2. PREFLIGHT ACTIVITIES RELATING TO THE PROPOSED CROSS-COUNTRY FLIGHT

11. PROPOSED ROUTE. Lay out the proposed route on the sectional aeronautical chart provided with the examination. Time can be saved in locating turning points, destination airports, and radio aids by utilizing the geographic coordinates which are either provided in the examination instructions or may be found in the Airman's Guide excerpts included with the examination.

a. Follow the instructions given in the examination and draw the course lines for the proposed route.

b. Determine the true course for each segment with a protractor, using the midmeridian for each segment.

c. Measure the distance for each segment, using the mileage scale at the bottom of the chart. For accurate measurement, use the center of the airport symbols -- not the edge.

d. Convert the true course of each route segment to magnetic course to determine the cruising altitudes that will conform to regulations.

e. Study the area along your proposed route and note the location of the following:

(1) Prominent checkpoints.

(2) Radio aids to navigation. Be certain to check this data against current information in the Airman's Guide.

(3) High terrain. Particular attention should be given to checking the elevation (height above sea level) of the higher ridges and peaks along the routes that traverse rough or mountainous country

(4) Obstructions. Note the elevations of high obstructions en route and in the vicinity of departure and destination landing fields.

(5) Control areas, control zones, and airport traffic areas.

(6) Prohibited, restricted, caution, and warning areas.

(7) Airports that could be used in an emergency.

12. CHECK OF THE WEATHER. Consult the local Weather Bureau Airport Station or an FAA Flight Service Station for flight weather briefings. Be able to read and interpret the following data:

a. (1) Identify fronts.

(2) Identify air masses.

(3) Read station model data, using the key furnished in the examinations.

b. Area forecasts.

c. Terminal forecasts. (The key is furnished in the private pilot examination, but not in the commercial pilot examination.)

d. Winds aloft forecasts.

e. SIGMETS (SIGnificant METeorological developments).

f. Advisories for Light Aircraft.

g. Hourly sequence reports. (The key is furnished in the private pilot examination, but not in the commercial pilot examination.)

13. FLIGHT PLANNING PUBLICATIONS - AIRMAN'S GUIDE AND FLIGHT INFORMATION MANUAL. Be familiar with and able to use the information contained in each of the following manuals:

a. AIRMAN'S GUIDE. Be able to refer to the Airman's Guide for the following information:

(1) Communication frequencies (control towers, ground control, Flight Service Stations, and VHF/DF stations).

(2) Navigational aid frequencies.

(3) NOTAMS (Notices to Airmen).

(4) Special Notices (lists of Military Climb Corridors and Oil Burner Routes, good operating practices, and other helpful information).

(5) Airport data. Use the DIRECTORY OF AIRPORTS supplement to the Airman's Guide for data on airport location and elevation, runway information, availability of fuel and service, availability of UNICOM and weather reporting facilities, and other pertinent information in the "remarks" column.

b. FLIGHT INFORMATION MANUAL.

(1) ATC visual flight rule procedures.

(2) Airport traffic control procedures.

(3) Light gun signals.

(4) Radio-telephone phraseology and techniques.

(5) Complete list of VOR receiver checkpoints.

(6) VHF/DF (direction-finding) data and procedures.

(7) U. S. aircraft emergency procedures, search and rescue procedures, emergency SCATER rules (security control of air traffic and electromagnetic radiations).

(8) U. S. Weather Bureau telephone numbers.

14. FAR REQUIREMENTS. Check your helicopter equipment and records and your personal qualifications to see that Federal Aviation Regulations have been met.

a. Check your helicopter for the following:

(1) Required documents aboard.

(2) Necessary inspections within the required time.

(3) Properly equipped for day flight, including operations in and out of airports on which United States Government-operated control towers are located.

(4) Properly equipped for night flight (commercial pilot).

b. Check your pilot qualifications for the following:

(1) Proper pilot and medical certificates.

(2) Compliance with recency of experience requirements for carrying passengers (including night flight for commercial pilots).

c. Know the general privileges and limitations for your certificate (flying for hire, carrying passengers, pilot-in-command, etc.).

15. SELECTION OF CRUISING ALTITUDES. In selecting cruising altitudes, the following factors should be taken into consideration:

a. FAR requirements (hemispherical rule).

b. En route terrain and obstruction elevations.

c. VFR cloud separation requirements.

d. Winds aloft.

e. Restricted areas, including military climb corridors. (For additional information concerning prohibited, restricted, caution, and warning areas, see reverse side of aeronautical charts.)

16. REVIEW OF HELICOPTER FLIGHT MANUAL.

a. Consult the weight and balance data and determine that the helicopter is properly loaded. Know how to compute empty weight, useful load, and gross weight. Be sure to use the current Repair and Alteration Form.

b. Know how to use loading charts to determine if the C.G. is within limits.

(1) Know the adverse effects of improper C.G. location.

(2) Know how to recognize improper C.G. location during lift-off and hovering flight.

c. Review rotor speed, engine speed, and airspeed limitations.

d. Review the "airspeed versus altitude limitations" chart to determine the proper takeoff and landing profiles.

e. Check the performance charts as required for the following:

(1) Takeoff data.

(2) Climb data.

(3) Landing distance data.

(4) Hovering performance data.

(5) Cruise performance data.

f. Check the airspeed calibration data. (Remember that operational limitation airspeeds are in terms of calibrated airspeeds.)

g. Check on grade and quantity of fuel and oil required.

17. COMPUTATION OF NAVIGATION DATA. The computation should be based on proposed cruising altitudes, cruise performance data, and appropriate winds aloft.

a. Convert the wind aloft (which is given in knots) to miles per hour. Also, when required, convert temperatures given in Centigrade to Fahrenheit or vice versa. Interpolate for winds (and temperatures) at intermediate altitudes.

b. Compute true airspeed based on your proposed cruising indicated airspeed and the forecast temperatures aloft. Also know the "rule of thumb" often used.

c. Compute true headings and convert to magnetic headings by applying the appropriate magnetic variation corrections. Convert magnetic headings to compass headings by applying correction for deviation.

d. Compute estimated groundspeeds and estimated times en route.

e. Compute estimated fuel required for flight based on estimated times en route and the helicopter cruise performance charts.

f. Compute normal range and maximum range based on cruise performance charts.

18. SPECIAL TERRAIN CONSIDERATIONS. If the flight is to be made to, from, or over unusual or difficult terrain (mountains, deserts, high elevations, etc.), review special procedures or techniques to be used to ensure maximum level of safety with particular emphasis on performance capabilities.

19. VISUAL INSPECTION. Make a thorough visual inspection following the manufacturer's recommended procedure. During this inspection, a generous amount of fuel should be drained from the fuel strainer drain and fuel tank sump drain, and inspected for evidences of water contamination.

20. FILING A FLIGHT PLAN. Follow the recommended procedures in filing your VFR flight plan. Understand how to use flight following service.

SECTION 3. IN-FLIGHT ACTIVITIES RELATING TO THE PROPOSED CROSS-COUNTRY FLIGHT

21. PREFLIGHT GROUND CHECKS AND PRECAUTIONS. Immediately after starting the engine, observe the engine instruments, particularly the oil pressure gauge, for proper indications. Use the checklist to make the warmup and pre-takeoff checks. Use caution when operating on nonpaved surfaces to minimize gravel damage to rotors and other components.

22. PRE-TAKEOFF RADIO COMMUNICATIONS. Make your radio call to the tower (or ground control, if applicable) for takeoff (or taxi) instructions. If taking off from an airport on which an FSS is located, make your radio call to the FSS for airport advisory service.

23. SETTING THE ALTIMETER. Apply the current altimeter setting given by the tower or FSS to the altimeter-setting window of your altimeter. If taking off from a field where no altimeter setting is available, set your altimeter to the published field elevation.

24. AFTER-TAKEOFF CHECKS. After lift-off, check for proper loading and C.G. location; check power required to hover and check maximum power available if this will be a factor at your destination and operating limitations will not be exceeded. Make your takeoff and climb to conform to the "airspeed versus altitude limitations" chart profile.

25. ACTIVATION OF FLIGHT PLAN. Activate your VFR flight plan by calling the Flight Service Station or appropriate facility and reporting your time off.

26. CLIMB AND LEVEL OFF. Climb to your selected altitude and complete your level-off procedures. Take necessary precautions to ensure accuracy when making readings from the magnetic compass.

27. COMPLIANCE WITH AIR TRAFFIC RULES. Comply with FAR, Part 91, Air Traffic and General Operating Rules, at all times. Maintain a constant vigilance for other traffic.

28. TRUE AIRSPEED. Compute estimated true airspeeds based on indicated airspeeds, reading of the outside air temperature gauge, and your pressure altitude.

29. TRUE ALTITUDE. Be able to compute true altitudes when appropriate.

30. GROUNDSPEEDS. Determine time between checkpoints and compute groundspeed. Compute ETA over various checkpoints and destination.

31. FUEL MANAGEMENT. Use good fuel management procedures. Keep close check on fuel consumption rate. Maintain proper fuel/air mixture setting.

32. ENGINE INSTRUMENTS. Keep a continuous watch of all engine instruments.

33. CARBURETOR ICING. Monitor carburetor air temperature gauge and use carburetor heat in accordance with the manufacturer's recommendations to prevent the formation of carburetor ice. Be able to recognize symptoms of carburetor ice and know the proper procedure to eliminate it.

34. POSITION REPORTS. Make periodic VFR position reports to Flight Service Stations. Give PIREPS (Pilot Reports) on unusual weather or erratic operation of radio navigation aids. Request weather information if necessary.

35. RADIO AIDS TO NAVIGATION. Be able to follow VOR radials and interpret VOR receiver instrument indications to determine position relative to the station. Understand the importance of accurate tuning on noncrystal-controlled sets.

36. IN-FLIGHT WEATHER BROADCASTS. Monitor appropriate stations for the 15-minute-after-the-hour and 45-minute-after-the-hour weather broadcasts. Maintain a continuous listening watch for possible in-flight weather safety advisories (SIGMETS or advisories for light aircraft).

37. TURBULENCE PRODUCED BY AIRCRAFT. When operating in the vicinity of a large aircraft, be on the alert for **wingtip** or rotor-tip vortices (wake of extreme turbulence behind airplanes or below rotorcraft). Take recommended action if you inadvertently encounter **wingtip** vortices.

38. BEWARE OF BAD WEATHER. Avoid bad weather. Do not get trapped over an overcast. Before it is too late, resort if necessary, to one of aviation's most dependable safety devices - the 180° turn.

39. POWER ADJUSTMENTS. When making in-flight power adjustments, coordinate throttle and collective pitch control.

40. IN-FLIGHT EMERGENCIES. Be prepared for in-flight emergencies - engine failure (autorotation), equipment failure, or unexpected weather.

41. UTILIZE DIRECTION FINDING AND RADAR STATIONS. Understand how to obtain aid from VHF/DF stations and how to obtain radar assistance.

42. MILITARY CLIMB CORRIDORS. If you cross a Military Climb Corridor, be sure to fly at an altitude appropriate to the segment crossed. Check the aeronautical charts for these altitudes.

43. AIRPORT TRAFFIC AREAS AND AIRPORTS WITH AN FSS. If you take off or land at an airport located within an airport traffic area or at which an FSS is located, follow applicable FAR, Part 91 rules.

44. NIGHT FLIGHT CONSIDERATIONS. Know the official sunset time for the area over which you are flying. Turn on your navigation lights at the required time (private and commercial pilot). Be familiar with airport lighting, runway lighting, and taxiway lighting (commercial pilot).

45. RADIO COMMUNICATIONS AT DESTINATION. When approaching your destination, contact the tower for landing instructions or the FSS for airport advisory service as appropriate. Be able to interpret instructions and advisories.

46. LIGHT GUN SIGNALS. Watch for light gun signals from the tower, in the air, or on the ground, if your radio receiver becomes inoperative. Maintain a constant vigilance for other traffic.

47. VISUAL APPROACH SLOPE INDICATOR. Understand the purpose and use of the Visual Approach Slope Indicator (VASI).

48. POSTFLIGHT ACTIVITIES. After the flight is completed, close your flight plan with the appropriate facility and refuel the helicopter in order to reduce condensation in the tanks and possible water contamination of the fuel.

49. NOTIFICATION AND REPORTING OF AIRCRAFT ACCIDENTS. Understand procedures for notification and reporting of aircraft accidents and overdue aircraft as specified in CAB Safety Investigation Regulations, Part 320.

CHAPTER 3. STUDY OUTLINE FOR THE FLIGHT INSTRUCTOR HELICOPTER WRITTEN EXAMINATION

SECTION 1. FUNDAMENTALS OF FLIGHT INSTRUCTION

50. THE FLIGHT INSTRUCTOR (desirable characteristics).

a. Proper attitudes toward flight instruction.

b. Willingness to accept the responsibilities that go with flight instruction.

c. Desire to do a competent job.

d. Desire to develop and improve.

e. Knowledge of ways of improving.

f. Knowledge of personality "do's and don'ts."

g. Knowledge of subject.

h. Knowledge of teaching techniques.

51. THE LEARNING PROCESS. You should have an understanding of the factors, conditions, and principles that control the learning process.

a. Basic concepts and terminology (trial and error, understanding, insight, incentives, plateaus, reversals, etc.).

b. The place of motivation in learning.

(1) Factors and conditions that promote motivation.

(2) Factors and conditions that are detrimental to motivation.

c. Effects of praise and reproof.

d. Effects of physical and emotional disturbances on learning.

e. Rate of progress in learning.

52. THE PATTERN FOR INSTRUCTION -- how to guide the learning process.

a. Gain the confidence of the student.

b. Analyze each student and recognize individual differences.

c. Recognize physical and emotional disturbances in the student.

d. Know and understand successful techniques of flight instruction.

e. Recognize and avoid faulty instructional techniques.

f. Alter instructional techniques to fit the individual needs of students.

g. Evaluate each student's present knowledge, ability, and level of proficiency,and know the desired knowledge, ability, and level of proficiency that he should have at the completion of each phase of the training program.

h. Establish clear objectives.

i. Develop understanding and insight.

j. Develop ability to think and reason under normal and emergency conditions.

k. Use the basic elements of flight instruction - preparation, demonstration, practice, and review.

l. Evaluate the student and keep him informed of his progress.

53. PLANNING -- vital to teaching success.

a. Use and know the values of a lesson plan.

b. Prepare for each phase of a training period - preflight, in-flight and postflight.

c. Preflight preparation and briefing.

(1) Choose an appropriate time and place.

(2) Cover the fundamentals of new maneuvers or procedures to be introduced on the flight, tell how they are to be performed, and you may cover some of the probable errors in performance.

(3) Relate new maneuvers or procedures to previous maneuvers or procedures, and also to those that may follow.

(4) Use instructional aids if appropriate.

(5) Permit and answer student's questions throughout the briefing.

d. In-flight planning.

(1) Demonstrate new maneuvers or procedures.

(2) Student practice and review.

(3) Recognize, analyze, and correct student errors and difficulties.

(4) Place proper emphasis on flight discipline and flight safety.

e. Postflight critique.

(1) Discuss good and bad points of the student's flight.

(2) Have the student evaluate his performance.

(3) Permit and answer student's questions throughout the critique.

(4) Make proper use of directed study assignments - homework and solo practice periods.

(5) Evaluate the student's progress.

SECTION 2. PERFORMANCE AND ANALYSIS OF FLIGHT TRAINING MANEUVERS

54. FLIGHT TRAINING MANEUVERS AND PROCEDURES. These will be based on a helicopter with a single main rotor and antitorgue (tail) rotor.

a. Preflight, warmup, before-takeoff, in-flight, and postflight checks and procedures.

b. Taxiing.

c. Normal takeoffs and landings.

d. Crosswind takeoffs and landings.

e. Slope takeoffs and landings.

f. High altitude takeoffs and roll-on (run-on) landings.

g. Straight-and-level flight and level turns.

h. Climbs and descents (including turns).

i. Steep approaches.

j. Hovering upwind, crosswind, and downwind.

k. Hovering 180° and 360° turns.

l. Pattern flying with constant and with changing headings.

m. "S" turns.

n. Rapid decelerations (quick stops).

o. Autorotative landings.

p. Emergency operations.

55. ANALYSIS OF MANEUVERS AND PROCEDURES.

a. Know how and when to introduce maneuvers and procedures in the training program.

b. Know how to perform the maneuvers and procedures properly.

c. Know and be able to recognize and analyze common student errors.

d. Be familiar with effective methods of correcting student errors.

e. Have a thorough knowledge of safe flying practices and principles.

56. ADDITIONAL COVERAGE. The flight instructor applicant may also be tested on any of the items given in the study outline for the private and commercial pilot written examinations with the emphasis placed more on the underlying principles rather than on the specific aeronautical knowledge.

APPENDIX 1. RECOMMENDED STUDY MATERIALS

1. LIST OF RECOMMENDED STUDY MATERIALS AVAILABLE TO APPLICANTS. The following publications should be helpful to an applicant preparing for the private pilot, commercial pilot, or flight instructor written examination for helicopters with the exception of the last two which will normally be of interest only to the flight instructor applicant.

   a. Airman's Guide ($7.00 annual subscription). Published every two weeks, every issue contains Notices to Airmen, Radar-Radio Listings, and a Special Notices Section, and once every quarter the Airman's Guide Supplement is published containing the Directory of Airports and Seaplane Bases. Single issue prices vary. Information should be requested from Superintendent of Documents for price and availability.

   b. Flight Information Manual ($3.75). An FAA publication issued in looseleaf form containing the relatively permanent information essential to the pilot, with regard to air traffic control procedures (VFR and IFR), emergency procedures, radar, search and rescue, air navigation radio aids, good operating practices, D/F data, DME, VOR, weather broadcast service, and many other vital matters.

   c. Private Pilot's Handbook of Aeronautical Knowledge ($2.50). This text of basic aeronautical knowledge was designed to meet the needs of the private pilot - airplane. However, many of the chapters will be helpful to pilot applicants in the helicopter rating area, in particular, those chapters on weather, navigation, Flight Information Publications, flight computer, radio communications, and flight planning.

   d. Path of Flight ($.70). Presents and explains the fundamentals of navigation in VFR flying.

   e. Realm of Flight ($.75). Explains the basic principles of meteorology and offers specific suggestions for interpretation of weather data and weather conditions encountered in flight.

   f. Practical Air Navigation ($4.00). This is the revised commercial edition of CAA Bulletin No. 24. It may be obtained from many dealers and distributors or from the publishers,

      Weem's System of Navigation, Inc.
      229 Prince George Street
      Annapolis, Maryland.

   g. Terrain Flying ($.40). A composite picture of the observations, opinions, warnings, and advice from veteran pilots.

h. Pilot's Weather Handbook, Technical Manual 104 ($1.50). Weather phenomena presented from the viewpoint of the pilot rather than the meteorologist.

i. Weather Services for Pilots ($.10). This publication should do much to explain the weather services available through U. S. Weather Bureau Stations and FAA Flight Service Stations. It explains in considerable detail weather reports and forecasts available and useful to pilots, and how to obtain them.

j. Pilot's Radio Handbook ($.75). This useful manual explains in simple language the proper use of radio for communication and navigation. It offers worthwhile information relative to DME, terminal omnirange, radar, and standard air-to-ground communication equipment. It explains correct air traffic control procedures, weather reporting, and the U. S. Common System of Air Navigation.

k. Federal Aviation Regulations.

(1) Part 1 - Definitions and Abbreviations ($.25).

(2) Part 61 - Certification: Pilots and Flight Instructors ($.30).

(3) Part 91 - Air Traffic and General Operating Rules ($.30).

(4) Civil Aeronautics Manual 6 - Rotorcraft Airworthiness -- Normal Category ($.55).

l. Civil Aeronautics Board, Safety Investigation Regulations, Part 320 ($.05). This publication covers the rules and procedures to be followed in the notification and reporting of aircraft accidents, in-flight hazards, and overdue aircraft.

m. Rules of Flight, FAA ($.55). This is an excellent publication covering basic information on requirements for pilot certification, rules of the air, air traffic control, aircraft registration, airworthiness, maintenance, and inspection. It also tells where more detailed information about each of these subjects may be found.

n. FAA-Approved Helicopter Flight Manuals. These may be obtained from individual aircraft manufacturing companies or from local dealers and distributors.

o. Flight Instructor's Handbook, Technical Manual 105, ($1.50). Part 1 of this handbook, entitled "Fundamentals of Teaching," presents much useful material on good instructional techniques and the learning processes that will be helpful in preparing for the "Fundamentals of Instructing" section of the Flight Instructor Written Examination. (Applicable to Flight Instructor only.)

p. How to Instruct, AF Manual 50-9 ($2.00). Although written primarily for the Air Force instructor, this manual covers basic teaching principles and general suggestions for their application which will prove helpful to any instructor. (Applicable to flight instructor only.)

2. RECOMMENDED STUDY MATERIALS NOT GENERALLY AVAILABLE TO APPLICANTS. The following publications are training manuals used by Military Pilot Training Schools which are not published as "for sale" items by the Government Printing Office. If they can be obtained, however, they will make excellent sources of study.

a. Department of the Army Technical Manual, TM 1-260, Principles of Rotary Wing Flight. This manual, well illustrated, contains excellent chapters on basic helicopter aerodynamics, principles of helicopter flight, takeoff and approach technique, autorotations, operations in confined areas, cross-country flight, night flying, precautionary measures and critical conditions, practical methods for predicting performance and air density, and computation of density altitude.

b. Helicopter Primary Training Manual (Department of the Army). This manual is used in the initial phases of training of Army helicopter pilots. Although the maneuvers are based on a particular helicopter, there is still much information of a general nature that makes it an excellent source of study, especially for the flight instructor applicant.

c. Helicopter Training Manual (Navy), NavAer 00-80T-41. This manual, well illustrated, contains sections on history, development, aerodynamics, forces, component parts, operation, weight and balance, and handling.

d. Principles of Helicopter Flight (Naval Air Basic Training Command). This manual is used as a textbook in the academic training phase by the Naval Air Basic Training Command, and contains sections on elementary theory, vertical flight, rotor system in forward flight, basic rotor head types, performance factors, hazards, and control characteristics.

e. Flight Training Instructions, Volume 1, Helicopter Primary and Basic Phase. This manual is used as an explanatory aid to the Naval Air Basic Training Command Helicopter Flight Syllabus, and contains detailed procedures for the performance of helicopter maneuvers.

3. HOW TO OBTAIN STUDY MATERIALS. All study materials listed in paragraph 1 of this Appendix except Practical Air Navigation and Helicopter Flight Manuals may be obtained by remitting check or money order to:

Superintendent of Documents
U. S. Government Printing Office
Washington, D. C. 20402

In many instances, these materials may be obtained at airports or from bookstores that carry them in stock.

4. ADDITIONAL STUDY MATERIALS. In addition to the list of materials in paragraphs 1 and 2, there are many excellent commercially prepared textbooks, audiovisual training aids, and other instructional materials which may be helpful in preparing for the examination.

APPENDIX 2. SAMPLE EXAMINATION TEST ITEMS

1. SAMPLE TEST ITEMS. The following examination test items are included to familiarize you with the type that will be used in the written examination. These particular questions are written at a level of difficulty commensurate with the aeronautical knowledge expected of a private pilot.

Test Item 1.

If you are unable to obtain an altimeter setting for your airport of takeoff, you should set your altimeter to indicate

1- zero feet.
2- 29.92 in the "altimeter setting" window.
3- the published elevation of the airport.
4- a lower altitude than the published elevation of the airport.

Test Item 2.

You can receive regularly scheduled weather reports from Flight Service Stations (FSS's)

1- on the hour and the half hour.
2- 28 minutes past each hour.
3- on the hour.
4- at 15 minutes and 45 minutes past each hour.

Test Item 3.

Which of the following combinations most adversely affects helicopter hovering performance?

1- High temperature and a calm wind.
2- Low temperature and a calm wind.
3- High temperature and a moderate wind.
4- Low temperature and a moderate wind.

Test Item 4.

The most current information concerning airport facilities and other important airport data may be found

1- in the Flight Information Manual.
2- in the Airman's Guide and its supplement.
3- on the back of a sectional aeronautical chart.
4- on the front of a sectional aeronautical chart.

Test Item 5.

On sectional aeronautical charts, the elevation of an obstruction is given

1- only if it extends more than 500 feet above the surrounding terrain.
2- in feet above mean sea level (MSL).
3- in feet above the ground on which it is located.
4- in feet above mean sea level and the symbol used indicates if it extends more than 500 feet above the terrain.

2. ANSWERS TO SAMPLE TEST ITEMS.

Test Item	Correct Response
1	3
2	4
3	1
4	2
5	2

3. EXPLANATIONS TO SAMPLE TEST ITEMS.

Test Item 1.

FAR, Part 91.81, states that in case an aircraft is not equipped with radio, the altimeter should be set to the elevation of the departure airport or to an appropriate altimeter setting available before departure.

Test Item 2.

The Private Pilot's Handbook of Aeronautical Knowledge states that all Flight Service Stations broadcast weather reports and other airway information at 15 and 45 minutes past each hour.

Test Item 3.

The Private Pilot's Handbook of Aeronautical Knowledge states that "when air is heated, it expands and therefore has less density. A cubic foot of warm air is less dense than a cubic foot of cold air. As air density decreases, lift (produced by an airfoil) decreases." Because of the decrease in air density, (increase in density altitude), the helicopter rotor blades will produce less lift in high temperatures than in low temperatures.

Test Item 3 (Cont.)

A helicopter rotor system produces more lift when in horizontal flight or hovering in a wind (especially when the wind is 15 miles per hour or more) due to the increased efficiency of the rotor system. This added lift is not present during calm wind conditions.

Test Item 4.

The Flight Information Manual contains no information concerning airport facilities and data. Sectional aeronautical charts are published every six months, so information contained on the charts may be up to six months old. The Airman's Guide is published every two weeks and the Airman's Guide Supplement each quarter. It is easily seen then that the Airman's Guide and its supplement contain the most current information concerning airport facilities and other airport data.

Test Item 5.

The symbol for obstructions is shown on the back of sectional aeronautical charts. Beneath this symbol is the following statement: Numerals indicate elevation above sea level of top.