Federal Aviation Agency

ADVISORY CIRCULAR

AC NO:	AC 61-5A
	AIRMEN
EFFECTIVE:	8/14/67

SUBJECT: HELICOPTER PILOT WRITTEN TEST GUIDE, PRIVATE - COMMERCIAL

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1. PURPOSE. This advisory circular is being issued to give guidance to applicants preparing for the aeronautical knowledge requirements for a private or commercial pilot certificate with a helicopter rating.

2. CANCELLATION.

   AC No. 61-5, effective November 1, 1963, is canceled.

3. HOW TO GET THIS PUBLICATION.

   a. Order copies of this publication from:

      Office of Headquarters Operations, HQ-438
      Federal Aviation Administration
      Washington, D. C. 20590

   b. Identify the publication in your order as:

      FAA Advisory Circular AC 61-5A
      Helicopter Pilot Written Test Guide, Private - Commercial

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PREFACE

The Flight Standards Service, Federal Aviation Administration, has issued this Helicopter Pilot Written **Test Guide** Private and Commercial, to assist applicants who are preparing for the helicopter pilot written tests. It was prepared by the same Federal Aviation Administration specialists who developed the helicopter written tests currently in use. Its purpose is to guide prospective applicants towards a clear understanding of the requirements, reference material, tests, and testing procedures. A study outline, list of study materials, and sample test with answers and explanations are presented.

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CHAPTER 1. NATURE OF THE WRITTEN TEST

1. INTRODUCTION. This study guide was prepared by the Federal Aviation Administration to assist applicants who are preparing for the Private or the Commercial Pilot (Helicopter) Written **Test Guide.**

   This guide is not offered as a quick and easy way to obtain the knowledge necessary for passing the written test; there is NO quick and easy way to obtain the background of experience, knowledge, and skill that the present-day pilot must acquire. Rather, the intent of this guide is to define the scope and narrow the field of study, insofar as possible, to the knowledge requisite to the Private or the Commercial Pilot (Helicopter) Certificate.

2. TYPE OF TEST ITEMS. Test items are of the "objective, multiple-choice" type. Each can be answered by the selection of a single response from among the four presented. This type of test has several advantages, two of which are: (1) rapidity in scoring, making it possible for the applicant to receive his grade as soon as possible, and (2) elimination of subjective scoring, the element of individual judgment in determining the grade.

3. TAKING THE TEST. The equipment needed for taking the test includes a protractor or plotter, and a computer, preferably one with a wind vector face. It is also desirable to have a pair of dividers for accurate measurement of distances.

   Always bear in mind the following facts when you are taking the test:

   a. There are no "trick items." Each statement means exactly what it says. Do not look for hidden meanings nor read into the test item something that is not intended. Unless specifically stated otherwise, test items do not concern exceptions to the rule; they are based on the general rule.

   b. Always read the complete test items, including the optional responses, before you make your choice. Be sure that you understand what they mean. Then, from the list of alternative responses, decide which one you think is correct. Be sure that the one you select answers the test item completely.

c. Only ONE of the responses given is completely correct. The others may be the result of incorrect computations, misconceptions of rules and principles, or erroneous or imcomplete analysis of the problem. Be sure that you understand and consider all factors.

d. Each test item is independent of other test items; that is, the correct response to one item is not based on the correct response to a previous item, although occasionally the same factors may be used.

e. If you find that you have considerable difficulty with a particular test item, do not spend too much time on it. Go on to the next item. When you reach the end of the test, go back to any items which you have passed over previously. This will enable you to use the available time to maximum advantage in demonstrating your knowledge and understanding of the subject.

4. CERTIFICATE REQUIREMENTS. The general qualifications for a private or commercial pilot certificate require of the applicant a combination of experience, knowledge, and skill. An applicant for a private or commercial pilot certificate with a rotorcraft rating should carefully review the applicable sections of Federal Aviation Regulations, Part 61, for detailed information on these qualifications.

CHAPTER 2. STUDY OUTLINE FOR THE PRIVATE OR COMMERCIAL PILOT HELICOPTER WRITTEN TEST

5. INTRODUCTION. This study outline is the framework of basic aeronautical knowledge that the prospective private or commercial pilot must know and be able to apply to pertinent situations. Every test item can be directly related to one or more of the topics contained in this outline. Frequently, topics may overlap when the situation demands the application of several knowledge areas to arrive at the complete solution of a problem. This subject matter is predicated on operationally realistic airman activity and encompasses the requirements specified in Federal Aviation Regulations. Many topics in this outline are referenced to a few of the sources of information.

6. FEDERAL AVIATION REGULATIONS.

a. Have knowledge of:

(1) Pilot privileges and limitations (FAR Part 61).

(2) Recency of experience requirements (FAR Part 61).

(3) Pilot certificates (FAR Part 61).

(4) Pilot medical certificates (FAR Part 61).

(5) Pilot responsibilities and preflight actions (FAR Part 91; Exam-O-Gram 4).

(6) Aircraft maintenance and inspection requirements (FAR Part 91; Exam-O-Gram 26).

(7) Aircraft certificates and documents (FAR Part 91; Exam-O-Gram 26).

(8) General operating rules (FAR Part 91; Exam-O-Grams 4, 6).

(9) General flight rules (FAR Part 91; Exam-O-Grams 2, 4).

(10) Visual flight rules (FAR Part 91; Exam-O-Grams 1, 7).

(11) Operating rules at airports (FAR Part 91; AIM).

(Exam-O-Grams refer to VFR Exam-O-Grams)

(12) Airport traffic signals and markings (FAR Part 91; AIM).

(13) Accident reporting rules (NTSB SIR Part 320; AIM).

7. FLIGHT INFORMATION PUBLICATIONS AND AERONAUTICAL CHARTS.

a. Have knowledge of:

(1) Airman's Information Manual (AIM).

(2) Aeronautical chart symbols (Sectional Aeronautical Chart; Exam-O-Grams 23, 24, 25).

(3) Military climb corridors, restricted and prohibited areas (Exam-O-Gram 25).

(4) Use of airport advisory service (AIM; Exam-O-Grams 14, 22, 24).

(5) Radio facility data and symbols (AIM; Exam-O-Grams 14, 22, 24).

(6) Controlled airspace boundaries (AIM; Sectional Aeronautical Chart; FAR Parts 1, 71).

(7) Significance of runway and helicopter landing area designations (AIM).

b. Be able to:

(1) Obtain radio facility information (AIM; Exam-O-Grams 14, 22, 24).

(2) Obtain airport and heliport facility information (AIM; Sectional Aeronautical Chart).

(3) Select appropriate aeronautical charts (Sectional Aeronautical Chart; Exam-O-Grams 4, 25).

(4) Determine terrain and obstruction clearance (Sectional Aeronautical Chart; Exam-O-Gram 23).

(5) Relate FAR flight rules to airport symbols or data.

(6) Relate FAR flight rules to chart elevations.

(7) Relate FAR flight rules to controlled airspace symbols.

(8) Relate FAR flight rules to restricted or prohibited areas.

8. WEATHER FUNDAMENTALS, FORECASTS AND REPORTS (Reference: Aviation Weather AC 00-6)

a. Have knowledge of:

(1) Measurement of atmospheric pressure.

(2) Cause of atmospheric circulation. *

(3) Effect of mountains and other obstructions on wind.

(4) Relative humidity and its effect on flight.

(5) Process by which air reaches the saturation point.

(6) Effect of temperature on air density.

(7) Effect of temperature on aircraft performance.

(8) Cloud types and associated weather.

(9) Fog, frost, clouds, and precipitation.

(10) Thunderstorms and turbulence.

(11) Freezing levels and icing conditions (Exam-O-Gram 21).

(12) Characteristics of a cold front.

(13) Characteristics of a warm front.

(14) Characteristics of an occluded front.

(15) Symbols used in aviation weather reports and forecasts.

(16) Weather broadcasts (Exam-O-Grams 5, 17, 26).

(17) Significance of temperature/dewpoint reports (Exam-O-Gram 21).

(18) Significance of cloud and ceiling reports (Exam-O-Grams 17, 20, 21).

(19) Significance of surface wind reports (Exam-O-Grams 17, 21, 26).

(20) Significance of atmospheric pressure reports (Exam-O-Gram 21).

* Commercial pilots only

b. Be able to:

(1) Recognize basic weather conditions and trends on surface weather maps.

(2) Interpret and relate Area Forecasts to the route of flight.

(3) Interpret and relate Terminal Forecasts to the route of flight.

(4) Interpret and relate In-flight Advisories to the route of flight.

(5) Interpret and relate Aviation Weather (Hourly Sequence) Reports to the route of flight.

(6) Interpret and relate Pilot Reports (PIREPS) to the route of flight.

(7) Interpret and relate Winds Aloft Forecasts to the route of flight.

(8) Relate surface wind reports to available runways.

(9) Relate weather conditions or information to FAR flight rules.

(10) Obtain weather information during preflight planning and while enroute.

(11) Relate GMT (Z time) to local time in analysis of weather information.

9. PILOTAGE, DEAD RECKONING, AND RADIO NAVIGATION.

a. Have knowledge of:

(1) Principles of pilotage.

(2) Principles of dead reckoning.

(3) Chart projections used for air navigation. *

(4) Time zones and 24-hour clock system.

(5) Effects of wind on navigation.

* Commercial pilots only

(6) Significance of magnetic variation and compass deviation (Exam-O-Gram 12).

(7) Significance of and relationship between track, course, heading, bearing, and radial.

(8) Significance of and relationship between true airspeed, indicated airspeed and groundspeed.

(9) Use of navigation computers--slide rule side and wind vector side.

(10) Radio navigation through the use of VOR/VORTAC facilities.

(11) Radio navigation through the use of L/MF radio facilities.

(12) Operational characteristics and precautions to observe in the use of VOR/VORTAC or L/MF facilities.

b. Be able to:

(1) Measure distances and courses on the chart.

(2) Interpret chart symbols.

(3) Select appropriate landmarks and checkpoints on the chart.

(4) Select cruising altitudes based on the direction of flight (Exam-O-Grams 2, 17, 22).

(5) Select cruising altitudes based on weather conditions (Exam-O-Gram 2).

(6) Determine winds by interpolation of Winds Aloft Forecasts.

(7) Determine headings (using Winds Aloft) by wind triangle or computer.

(8) Determine compass heading (using compass correction card).

(9) Determine groundspeed and ETAs (using Winds Aloft) by wind triangle or computer.

(10) Determine groundspeed and/or ETAs by in-flight check.

(11) Determine time, distance, or speed (using Winds Aloft) by wind triangle or computer.

(12) Determine fuel consumption or rate of consumption from performance chart and/or computer.

(13) Determine true airspeed from altitude, temperature, and IAS using computer.

(14) Determine rate of climb or descent using computer. *

(15) Determine true altitude, pressure altitude, and density altitude.

(16) Interpret VOR receiver (OMNI) cockpit indications.

(17) Interpret bearing information from an ADF receiver.

10. RADIO COMMUNICATIONS.

a. Have knowledge of:

(1) Radio procedures and phraseology (AIM; Exam-O-Gram 14).

(2) Standard transmitting and receiving frequencies (AIM; Exam-O-Grams 14, 24).

(3) Availability of in-flight assistance (Exam-O-Grams 19, 26).

(4) Air defense emergencies--SCATANA (AIM).

(5) Direction finding procedures (AIM; Exam-O-Gram 19).

b. Be able to:

(1) Determine when communications are required (Exam-O-Grams 1, 24).

(2) Interpret airport traffic instructions and plan approaches and departures.

(3) Interpret enroute traffic instructions (AIM).

(4) Obtain emergency assistance (Exam-O-Gram 19).

* Commercial pilots only.

(16) Inflight emergency procedures:

(a) Engine failure and transition to autorotation.

(b) Antitorque system or tail rotor failure.

(17) Airspeed versus altitude limitations (height-velocity curve).

(18) Rotor speed and engine speed limitations.

(19) Conditions favorable for carburetor icing.

(20) Indications, elimination and prevention of carburetor icing.

(21) Effect of improper use of mixture control (Exam-O-Gram 38).

(22) Effect of frost, ice, or snow on airfoils-rotor blades (Exam-O-Gram 28).

(23) Fuel contamination--detection and preventative measures (Exam-O-Gram 8).

(24) Dangers associated with aircraft wake turbulence--wingtip or rotor-tip vortices.

14. HELICOPTER PERFORMANCE.

a. Have knowledge of

(1) Helicopter flight manual.

(a) Operating limitations.

(b) Operating procedures.

(c) Performance information.

(d) Placard information.

(2) Effect of temperature, altitude and humidity on helicopter and engine performance.

(3) Effect of gross weight on helicopter performance.

(4) Effect of C.G. location on helicopter performance.

(5) Effect of wind on helicopter performance.

(6) Practical methods for predicting helicopter performance.

(a) Manifold pressure and payload.

(b) Manifold pressure and hovering ceiling.

(c) Payload and wind.

(d) Hovering and skid height.

(e) Hovering ceiling and gross weight.

(f) Service ceiling and gross weight.

(7) Confined area operations.

(8) Precautionary measures and critical conditions.

b. Be able to

(1) Compute empty weight, useful load, and gross weight.

(2) Compute location of C.G. from loading charts or tables, and determine if within allowable limits.

(3) Use flight manual charts or data to determine the following:

(a) Hovering performance.

(b) Takeoff performance.

(c) Climb performance.

(d) Cruise performance.

(e) Landing performance.

11. FLIGHT INSTRUMENTS AND RELATED FACTORS.

a. Have knowledge of:

(1) Characteristics and errors of the magnetic compass (Exam-O-Gram 12).

(2) Airspeed limitations.

(3) Significance of altimeter settings (Exam-O-Gram 9).

(4) Significance of pressure and density altitude (Exam-O-Gram 11).

(5) Effect of temperature on altimeters (Exam-O-Gram 9).

b. Be able to:

(1) Apply altimeter settings and compensate for errors.

(2) Interpret altitude indications (Exam-O-Gram 9).

(3) Determine pressure altitude from appropriate charts, pressure reports, or altimeter adjustment.

(4) Determine density altitude from appropriate charts or associated factors.

12. HELICOPTER AERODYNAMICS AND PRINCIPLES OF FLIGHT.

a. Have knowledge of:

(1) Terminology and definitions.

(2) Theory of airfoils and rotary wings.

(3) Forces acting on the helicopter.

(4) Function of the controls.

(5) Autorotation.

(6) Loads and load factors.

(7) Helicopter stability.

13. HELICOPTER AND ENGINE OPERATION.

a. Have working knowledge of the following as they relate to safe flight operations and general safety practices:

(1) Flight control system.

(2) Fuel and fuel system--usable and unusable fuel.

(3) Oil and oil system.

(4) Electrical system.

(5) Reciprocating engine principles and components.

(6) Carburetion.

(7) Ignition system.

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

(9) Engine instruments and controls.

(10) Transmission system.

(11) Swash plate assembly.

(12) Clutch.

(13) Freewheeling unit.

(14) Collective pitch--throttle control and coordination.

(15) Hazards of helicopter flight:

(a) Retreating blade stall.

(b) Settling with power.

(c) Ground resonance.

(d) Abnormal vibrations associated with main rotor, tail rotor, and engine.

APPENDIX 1. RECOMMENDED STUDY MATERIALS

NOTE: References listed were available or were in development at the time this publication went to press.

SECTION 1. BASIC LIST OF STUDY MATERIALS

1. BASIC HELICOPTER HANDBOOK, AC 61-13 ($.75), provides detailed information on helicopter aerodynamics, performance, and flight maneuvers to applicants preparing for private, commercial, and flight instructor pilot certificates with helicopter ratings. It is also useful to flight instructors in training students.

2. PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE, AC 61-23 ($2.75), is designed as a text of basic aeronautical knowledge for the airplane pilot. However, most of the chapters are applicable to private and commercial helicopter pilot applicants.

3. FEDERAL AVIATION REGULATIONS

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

   b. Part 61 - Certification: Pilots and Flight Instructors ($.60).

   c. Part 71 - Designation of Federal Airways, Controlled Airspace, and Reporting Points ($.20).

   d. Part 91 - General Operating and Flight Rules ($.60).

4. NATIONAL TRANSPORTATION SAFETY BOARD (formerly Civil Aeronautics Board) SAFETY INVESTIGATION REGULATIONS, Part 320. Rules pertaining to aircraft accidents, incidents, overdue aircraft and safety investigations. ($.05).

SECTION 2. OPTIONAL STUDY MATERIALS

5. AIRMAN'S INFORMATION MANUAL (AIM). The Airman's Information Manual has been designed as a pilot's operational manual for use primarily within the conterminous United States. It is divided into three basic parts, each of which may be purchased separately. Highlights of each part are described below.

   PART 1. - Basic Flight Manual and ATC Procedures.
   This part is issued quarterly and contains basic fundamentals required to fly in the National Airspace System; adverse factors affecting Safety of Flight; Health and Medical Facts of interest to pilots; ATC information affecting rules,

regulations and procedures; a Glossary of Aeronautical Terms; U.S. Entry and Departure Procedures, including Airports of Entry and Landing Rights Airports; Air Defense Identification Zones (ADIZ); Designated Mountainous Areas; Scatana, and Emergency Procedures. Annual subscription price $2.00. (Foreign mailing, 50 cents additional.)

PART 2. - Airport Directory.
This part is issued semiannually and contains a Directory of all Airports, Seaplane Bases, and Heliports in the conterminous United States, Puerto Rico, and the Virgin Islands which are available for transient civil use. It includes all of their facilities and services, except communications, in codified form. Those airports with communications are also listed in Part 3 which reflects their radio facilities.

Included, also, is a list of selected Commercial Broadcast Stations of 100 watts or more of power. Annual subscription price $2.00. (Foreign mailing, 50 cents additional.)

PART 3 AND 3A. - Operational Data and Notices to Airmen.
Part 3 is issued every 28 days and contains a Master Alphabetical Index covering all Parts of the AIM; an Airport/Facility Directory containing a list of all major airports with communications; a tabulation of Air Navigation Radio Aids and their assigned frequencies; Parachute Jump Areas; Preferred Routes; Standard Instrument Departures (SIDs); Substitute Route Structures; a Sectional Chart Bulletin, which updates Sectional Charts cumulatively; Restrictions to Enroute Navigation Aids; VOR Receiver Check Points; Special General and Area Notices; New and Permanently Closed Airports, and Oil Burner Routes.

Part 3A is issued every 14 days and contains Notices to Airmen considered essential to the safety of flight as well as supplemental data to Part 3. Annual subscription price $9.00. (Foreign mailing, $2.25 additional.)

6. REGULATIONS WRITTEN EXAMINATION GUIDE FOR PRIVATE, COMMERCIAL, AND MILITARY PILOTS, AC 61-34 ($.), outlines the scope of basic knowledge required for FAA private or commercial pilot certificates. Contains a sample examination with answers and explanations.

7. AVIATION WEATHER, AC 00-6 ($2.25), is a joint FAA/Weather Bureau publication which provides a comprehensive text for pilots and flight operations personnel. Gives the pilot a practical understanding of those meteorological principles important to aviation and essential to his

APPENDIX 2. SAMPLE TEST

The following test items are included for one purpose -- to familiarize you with the type of items you may expect to find on the FAA test. You should keep in mind that the test is, at best, a sampling of your aeronautical knowledge. It is for this reason that you should concentrate on the Chapter entitled STUDY OUTLINE FOR THE PRIVATE OR COMMERCIAL PILOT (HELICOPTER) WRITTEN TEST. A knowledge of all the topics mentioned in this outline -- not just the mastery of the sample test items -- should be used as the criterion for determining that you are properly prepared to take the FAA written test and meet the knowledge requirements for the Private or the Commercial Pilot Certificate.

The correct responses, with explanations, are presented in Section 2 of this Appendix.

SECTION 1. SAMPLE TEST ITEMS

1. Certain maintenance inspections are required by Regulations to be performed periodically. Completion of an "annual" inspection and the authorization for the return of the aircraft to service will always be indicated by the

   1- issuance date of the Airworthiness Certificate.
   2- completion date of the 100-hour inspection form.
   3- notation in the Aircraft and Engine records.
   4- completion of appropriate portions of a Repair and Alteration Form.

2. In planning a cross-country flight you determine that the total distance is 105 statute miles and that your average groundspeed will be 70 mph. The Helicopter Flight Manual shows the total fuel capacity is 29.8 gallons with 2.3 gallons unusable. If you start with full fuel tanks and consume 10.5 gallons per hour, how much usable fuel will remain at the completion of the flight?

   1- 8.7 gallons.
   2- 11.7 gallons.
   3- 14.0 gallons.
   4- 16.1 gallons.

3. Assume that you have a Commercial Pilot Certificate issued February 1, 1967, and a 2nd Class Medical Certificate dated December 2, 1966. Under these circumstances you could continue to exercise the privileges of

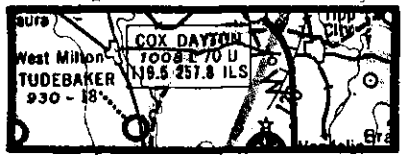
   1- a commercial pilot until December 2, 1967, and those of a private pilot until December 2, 1968.
   2- a commercial pilot until January 1, 1968, and those of a private pilot until January 1, 1969.
   3- either a commercial or private pilot until March 1, 1968.
   4- neither a commercial nor private pilot after January 1, 1968.

4. Consider the following Aviation Weather Report for Dayton, Ohio, where the field elevation is 1,008 feet:

   DAY 20ØE40Ø15 003/59/48 1715G20/954

   While flying over this airport you would expect to encounter the base of the ceiling at approximately

   1- 5,000 feet MSL.
   2- 4,000 feet MSL.
   3- 3,000 feet MSL.
   4- 2,000 feet MSL.



5. Assume that the above data is displayed on your Sectional Aeronautical Chart adjacent to the symbol of the airport at which you plan to land. From your knowledge of this boxed-in data you should know that to communicate with the control tower you could transmit on

   1- 119.5 or 122.5 and receive on 122.5.
   2- 119.5 and receive on 122.5.
   3- 119.5 only and receive on 119.5.
   4- 119.5 or 122.5 and receive on 119.5.

6. The following terminal forecast was issued at 7:00 A.M. for Lafayette:

   LAF C10Ø2GF 09C 7ØC10Ø2GF 11C 7ØC10Ø3F 13C C10Ø5F--

   If LAF lies within a control zone, what is the earliest time you would be able to take off or land in basic VFR conditions?

   1- 0700 CST.
   2- 0900 CST.
   3- 1100 CST.
   4- 1300 CST.

effective use of current and forecast weather information. Includes extensive material on present aviation weather services, a glossary of meteorological terms, and over 175 illustrations, many in color.

8. TERRAIN FLYING (being revised), presents a composite picture of the observations, warnings, and advice from veteran pilots about flying over the various types of terrain in the United States (including Alaska), and Mexico. Although written for the airplane pilot, this book should prove extremely valuable for the helicopter pilot.

9. VFR EXAM-O-GRAMS (Free) are analyses and explanations of selected topics of aeronautical knowledge presented in the form of questions and answers. Although slanted toward activities involving airplanes, much of the material is applicable to helicopter operations. These are issued on an irregular basis, are non-directive in nature, and are issued solely as an information service to individuals interested in aeronautical knowledge, and particularly applicants for Airman Written Tests.

SECTION 3. HOW TO OBTAIN STUDY MATERIALS

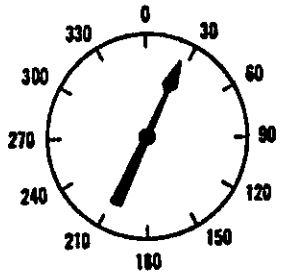
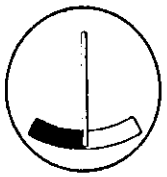
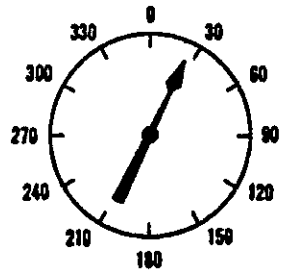
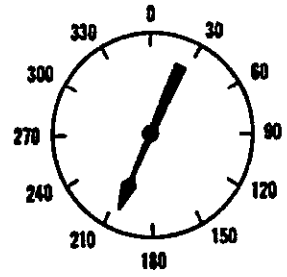
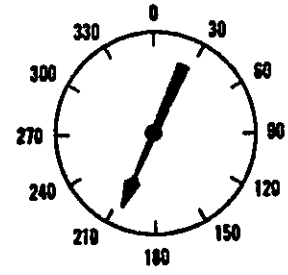
10. VFR EXAM-O-GRAMS are available free of charge (in limited quantities) by ordering from:

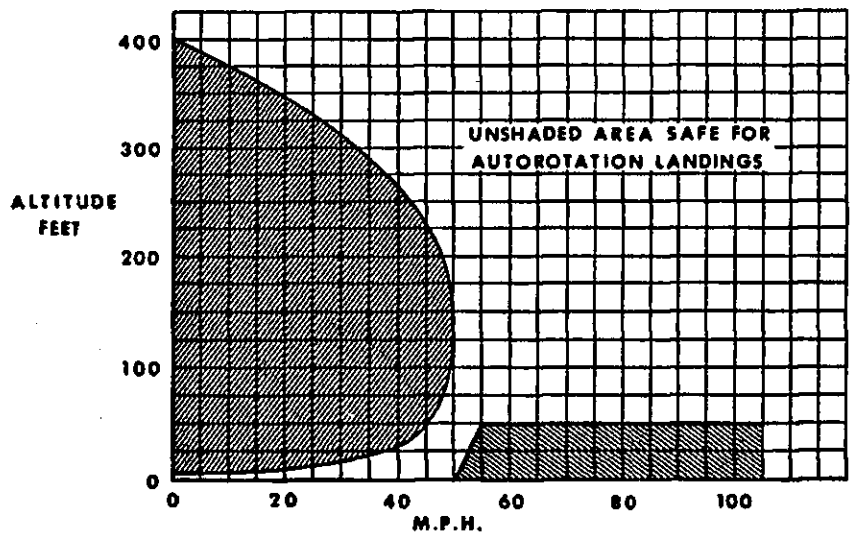
Federal Aviation **Administration**
Operations Branch, AC-240
P. O. Box 25082
Oklahoma City, Oklahoma 73125

11. OTHER STUDY MATERIALS. All other study materials listed may be obtained by remitting check or money order made payable to the SUPERINTENDENT OF DOCUMENTS. No C.O.D. orders are accepted. Orders for mailing or shipping to foreign countries should include an additional amount of one-fourth of the purchase price for postage. Address orders to:

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

7. If you are tuned to a VOR and have the course selector set properly to follow the 025° radial outbound from the station, which of the following represents the proper indications of the OMNI components assuming you are on course?

	COURSE SELECTOR	TO-FROM INDICATOR	LEFT-RIGHT INDICATOR
1-			
2-			
3-			
4-			



AIRSPEED vs. ALTITUDE CHART

8. Based on the "Airspeed vs. Altitude" Chart, which of the following airspeed-altitude combinations should be avoided?

	AIRSPEED	ALTITUDE
A.	35 MPH	100 Feet
B.	60 MPH	40 Feet
C.	35 MPH	350 Feet
D.	45 MPH	25 Feet

1- A and B only.
2- A, B, C, and D.
3- A and D only.
4- A only.

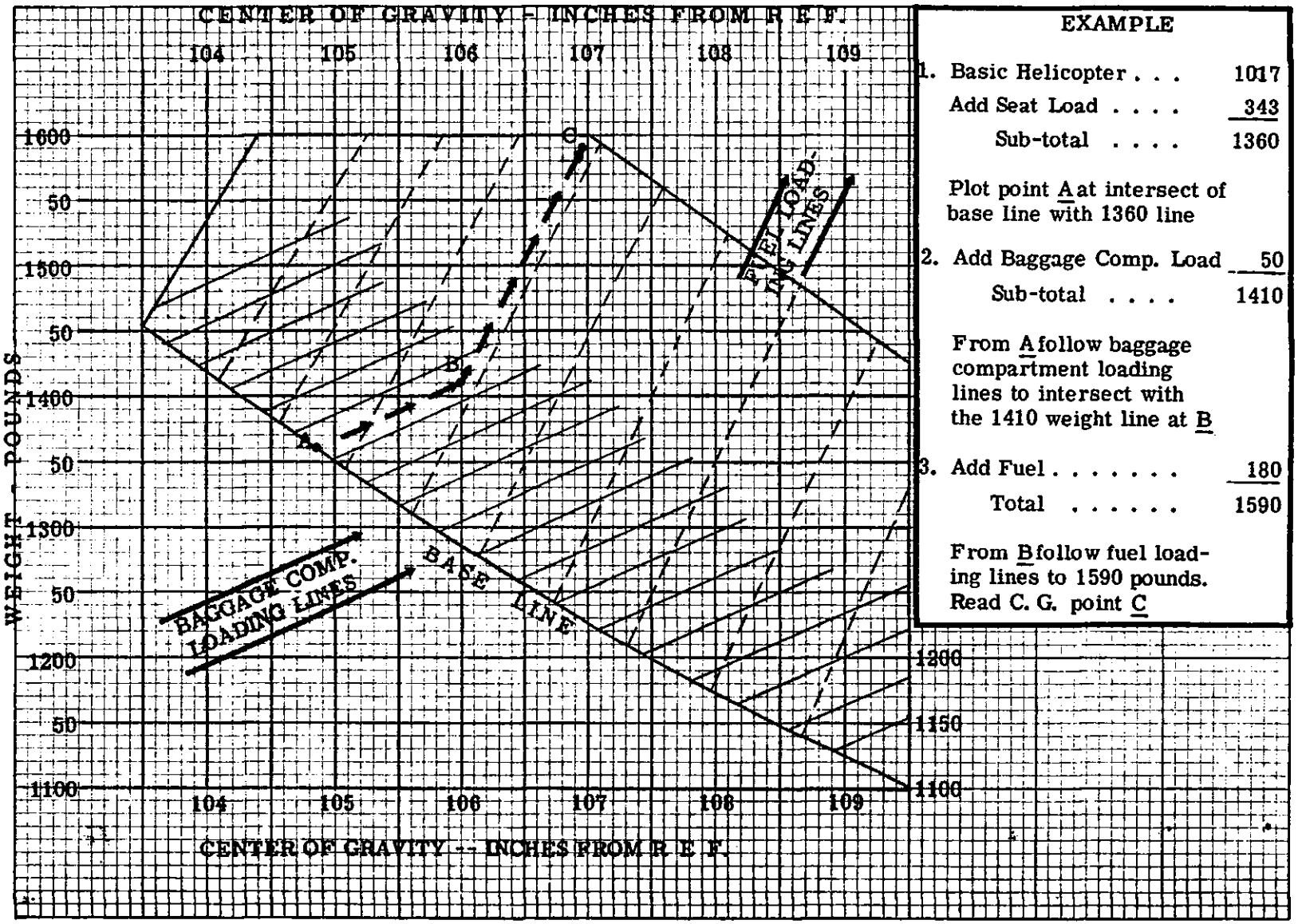
HOVERING CEILING
In Ground Effect 2900 RPM

Gross Weight Lbs.	Temperature		Hovering Ceiling Hp - Ft.	
			Dry Air	80% R. H.
1600	-20°F	-28.9°C	6700	6500
	20°F	-6.7°C	5500	5200
	60°F	15.6°C	4300	3900
	100°F	37.8°C	3000	1300
1500	-20°F	-28.9°C	8100	7900
	20°F	-6.7°C	7100	6800
	60°F	15.6°C	5900	5600
	100°F	37.8°C	4800	2900
1400	-20°F	-28.9°C	9900	9700
	20°F	-6.7°C	8700	8400
	60°F	15.6°C	7400	7100
	100°F	37.8°C	6300	4400
1300	-20°F	-28.9°C	11700	11400
	20°F	-6.7°C	10400	10100
	60°F	15.6°C	9400	9000
	100°F	37.8°C	8200	6100

9. Based on the Hovering Ceiling Chart above, and the following set of conditions, what hovering performance could you expect in ground effect?

Gross Weight	1600 lbs.
Pressure Altitude (Hp)	2000 ft.
Temperature	100° F.
Wind	Calm

1- Hovering should be possible with either dry air or 80% relative humidity.
2- Hovering should be possible only with dry air.
3- Hovering should not be possible with either dry air or 80% relative humidity.
4- Hovering should be possible with either dry air or 80% relative humidity but a running landing would be recommended.



EXAMPLE

1.	Basic Helicopter . . .	1017
	Add Seat Load	343
	Sub-total	1360

Plot point A at intersect of base line with 1360 line

2.	Add Baggage Comp. Load	50
	Sub-total	1410

From A follow baggage compartment loading lines to intersect with the 1410 weight line at B

3.	Add Fuel	180
	Total	1590

From B follow fuel loading lines to 1590 pounds. Read C. G. point C

* * * * *

EXCERPTS FROM THE HELICOPTER FLIGHT MANUAL

FUEL: 91/96 octane
Total fuel capacity (all usable) - 30 gallons

BASIC HELICOPTER (EMPTY) WEIGHT: 1,017 pounds

MAXIMUM GROSS WEIGHT: 1,600 pounds

MAXIMUM ALLOWABLE WEIGHT IN BAGGAGE COMPARTMENT: 50 pounds

* * * * *

10. You plan to make a solo flight in the helicopter described above. Your weight is 148 pounds and you wish to carry 30 pounds of baggage in the baggage compartment. Using the center-of-gravity chart on the opposite page, how much fuel can you carry under these conditions?

1- A full load.
2- A maximum of 23 gallons.
3- Not less than 23 gallons.
4- A maximum of 4 gallons.

(NOTE: A gallon of fuel weighs 6 pounds.)

SECTION 2. ANSWERS AND EXPLANATIONS FOR THE SAMPLE TEST

1. (3) An Airworthiness Certificate is issued when the aircraft is deemed airworthy at the time of manufacture or after substantial alteration or repair. Only when this certificate has been issued within the preceding 12 months will it indicate compliance with annual inspection requirements. Therefore, response number 1 is incorrect. Number 2 is incorrect because although an annual inspection each 12 months will satisfy 100-hour inspection requirements, a 100-hour inspection will not suffice for an annual inspection. Number 3 is correct because FAR stipulates that appropriate entries be made in maintenance records (logbooks) each time inspection or maintenance is done on the aircraft or engine. Number 4 is also incorrect since the Repair and Alteration Form is used for the description and approval of work done on a repaired or altered aircraft unit.

2. (2) This may be solved arithmetically or by use of a slide rule computer. At a groundspeed of 70 mph it will take 1 hour and 30 minutes to travel the distance of 105 miles. In 1 1/2 hours at the rate of consumption of 10.5 gph, the amount of fuel used will be 15.8 gallons. With only 27.5 gallons usable (29.8 - 2.3 = 27.5), the remaining usable fuel at the end of the flight will be 11.7 gallons. Therefore, response number 2 is correct while 1, 3, and 4 are incorrect.

3. (2) A Commercial Pilot Certificate has no specific expiration date and the issuance date is irrelevant to this situation. However, to be valid, the pilot must possess a current appropriate medical certificate. For operations requiring a Commercial Pilot Certificate, the 2nd Class Medical Certificate expires at the end of the last day of the 12th month after the month in which it is issued. Thus, commercial pilot privileges may be exercised until January 1, 1968. For operations requiring only a Private Pilot Certificate, a 2nd Class Medical Certificate expires at the end of the 24th month after the month in which it is issued. In this case, private pilot privileges may be exercised until January 1, 1969. Therefore, only response number 2 is correct.

4. (1) The reported ceiling in Aviation Weather (Hourly Sequence) Reports, is measured from the surface at the point of observation to the base of the phenomena forming the ceiling. Since the elevation of the surface at Dayton is 1,008 feet MSL and the reported ceiling (the broken layer of clouds) is 4,000 feet above the surface, the base of the clouds constituting the ceiling would be encountered at 5,000 feet MSL. Thus, response number 1 is correct while numbers 2, 3, and 4 are incorrect.

5. (4) The legend for the symbols used on Sectional Charts is found on the back of the charts. The first frequency listed in the boxed data for Dayton is the primary transmitting and receiving VHF frequency for local control. The second frequency is the primary military VHF/UHF frequency. Most FAA towers receive but do not transmit on the standard frequency of 122.5. If this frequency is available it is not shown, since it is considered standard. When the tower does not have this frequency it lists a different frequency followed by the letter R indicating that the tower, rather than guarding (receiving) the standard frequency, is guarding this nonstandard frequency. (For example: 122.7R.) Responses number 1 and 2 are incorrect because FAA towers do not transmit on 122.5, hence you cannot receive them on that frequency. Number 3 is also incorrect because 119.5 is not the only frequency on which you may transmit to the tower, since the standard frequency is also being guarded. Based on the data furnished, number 4 is correct. You can transmit on 119.5 or 122.5 and receive on 119.5.

6. (3) To land or take off within a control zone under basic VFR conditions, FAR requires a ceiling of 1,000 feet or more and at least 3 miles visibility. A ceiling is the lowest layer of clouds or obscuring phenomena that is reported as "broken," "overcast," or "obscuration" and not classified as "thin" or "partial." Reading the LAF forecast we find that at 0700 (issuing time) the ceiling and visibility are predicted to be 1,000 feet broken and 2 miles, which makes response number 1 incorrect. At 0900C the forecast calls for 700 feet scattered, ceiling 1,000 feet broken and 2 miles visibility. This rules out response number 2. The forecast then calls for 700 feet scattered, ceiling 1,000 feet broken and 3 miles visibility at 1100C meeting basic VFR requirements, making response number 3 correct. Since the earliest time at which basic VFR is expected is 1100C, response number 4 is incorrect.

7. (2) The proper procedure when flying directly away (following a radial outbound) from a VOR/VORTAC station is to set the course selector to the radial desired, in this case to 025°. Therefore, responses 3 and 4 would be incorrect. Since the test item states that you are on course (outbound) your TO-FROM indicator would read FROM. Therefore, response 1 is incorrect.

8. (1) Airspeed vs. altitude or height vs. velocity performance information is required by regulations for each model of helicopter certificated. This information is generally presented by charts, and portrays those airspeed-altitude combinations which are considered unsafe in the event an autorotative landing should become necessary. The airspeed-altitude combinations listed under A and B both lie within the shaded areas of the chart provided and should be avoided. The airspeed-altitude combinations listed under C and D both lie within the unshaded areas and are considered safe for the purpose of autorotative landings. Responses 2, 3, and 4 are incorrect because they contain either safe combinations or only one of the unsafe combinations.

9. (2) Based on the chart and conditions provided with this test item, it can be determined that hovering should be possible in ground effect up to a pressure altitude (Hp) of 3,000 feet in dry air and up to 1,300 feet with a relative humidity of 80% or greater. Therefore, hovering should be possible at a pressure altitude of 2,000 feet in dry air only. Responses 1, 3, and 4 all contain incorrect or partially incorrect statements.

10. (2) This loading problem can be computed as follows:

1.	Basic helicopter weight	1017 lbs.
	Add seat load	148 lbs.
	Sub-Total	1165
	Plot a point (A_1) at intersect of base line with 1165 weight line	
2.	Add baggage compartment load	30 lbs.
	Sub-Total	1195 lbs.
	From point A_1 follow baggage compartment loading lines to intersect with the 1195 weight line. Call this point B_1.	
3.	From B_1 follow fuel loading lines to intersect 109.5" line. (Maximum aft C.G. limit). Read horizontally to the left (follow weight lines) to determine gross weight.	
	Gross weight	1333 lbs.
	Less Sub-Total	1195 lbs.
		138 lbs.

4.	Fuel allowable weight	138 lbs.
	Divide this weight by 6 (fuel weight per gallon)	
	Gallons of fuel allowable	23

Therefore only response number 2 is correct.